



MANUAL FOR CONTROL OF HOSPITAL ASSOCIATED INFECTIONS

STANDARD OPERATIVE PROCEDURES



सत्यमेव जयते

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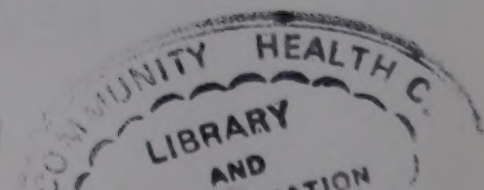
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NATIONAL INSTITUTE FOR CONTROL AND PREVENTION OF DISEASES

DIS-325

07204

1979





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FOREWORD

This Standard Operative Procedures book entitled "Manual for Control of Hospital Associated Infections" has taken into account the urgent need for uniform guidelines on Universal precautions in different primary, secondary and tertiary health care settings. With the advent of HIV/AIDS epidemic in India and elsewhere has necessitated the importance of adopting minimum standard safety precautions by the health care workers. This book covers all aspects of infection control in regard to all blood-borne pathogens including HIV and also discusses the management of safe waste-disposal.

This manual is meant to assist all hospitals and health centres in the country in preventing HIV, HBV and other infections in health care settings.

I hope this book will be of help to all those working in the field of HIV/AIDS prevention and control.

(J.V.R. PRASADA RAO)

Project Director

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Dated : August 12, 1999

PREFACE

The modern advances in medicine would not have been possible without realising the importance of Hospital Associated Infections (HAI). The usual pathogens associated with HIV have adapted to the special environment and have been the subject of considerable study. Nevertheless, HAI account for considerable financial and personal burden.

HIV and other highly infectious organisms can transmit from infected person to uninfected person. These modes could also involve hospital personnel. The hospital personnel may acquire such infections while working with such virulent microbes or when handling the infected person. It is also possible that the hospital personnel may act as passive source of such infections to fellow persons or even to his/her patients. Therefore, measures in the form of universal precautions, good personal hygiene and sanitation in hospital premises, to prevent further spread of such infections from patient to patients and to hospital personnel or vice-versa, are very important. This book emphasises on all these technical issues. The present operative manual deals with these issues and describes various preventive measures including infrastructure of the laboratory, knowledge, attitude and practices to be adopted by the health care workers while performing hospitals procedures, disinfection and disposal of infectious material and post-exposure management. The well known experts in the field have contributed chapters for this manual. I am sure that this Standard Operative Procedures Manual (SOPM) will serve an important role in hospital infection control in India.

(DR. S. P. AGARWAL)

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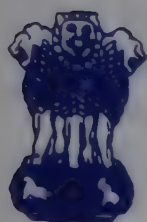
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ACKNOWLEDGEMENTS

I am extremely grateful to all the experts who contributed towards preparation of this manual. Their vast knowledge and experience in the field of infection control effectively helped in the final presentation of this document. Information in this document also has been derived from various periodicals and journals and individual mention of each reference has not been possible.

I am grateful to Mr. J.V.R. Prasada Rao, Additional Secretary and Project Director, National AIDS Control Organisation (NACO) for his initiative and interest in bringing out this standard operative manual.

I am thankful to Dr. S. P. Agarwal, Director General Health Services, for reviewing the manual so carefully and giving a preface.

I hope that this manual will be useful to all health care workers in the primary, secondary or tertiary levels and can be used as a good reference manual.

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Introduction

Infections acquired in the health care setting are the infections which patients acquire from health facilities and these were not being incubated at the time of entry. Symptoms may appear during or after admission. They also apply to infections among health care workers and visitors who acquire infections following exposure in the health care setting. This could apply also to infections acquired at home while providing home care.

The diagnosis of infections acquired in the health care setting is the same as other infections. It is based on clinical evidence of the disease with laboratory evidence to support in certain circumstances, provided that it can be proved that the causative organism(s) is /are acquired during the period when health care was provided.

The overall risk of acquiring infection in the health care setting increases in the presence of the following risk factors:

- **Patient factors:** Extreme ages, malnutrition, immune deficiency, injuries etc.
- **Microbial factors:** Agents present in high concentration, high level of virulence , emergence of resistant strains or the presence of new organisms in the health care environment.
- **Environmental factors:** Level of contamination with causative organisms and medical interventions that may facilitate their transmission. For example, surgery and invasive diagnostic or therapeutic procedures to susceptible persons.

The major concern at the present time, however, is the risk of acquiring HIV in the health care setting. Patients may get infected mainly by transmission of contaminated blood or blood products. Infection through contaminated medical equipment is also possible. Health care workers have been infected percutaneously, mainly by sharps injuries i.e. contaminated needles, scalpels and broken glass. Skin and mucosal contact with fluids contaminated with HIV has been incriminated in a few cases. The same mechanism of transmission applies to Hepatitis B and Hepatitis C (HBV, HCV) infections and the risk is much higher due to the high prevalence of Hepatitis B and C carriers and high infectivity of the virus.

Risk Of Transmission Of Bloodborne Viruses To Health Care Workers

Human immunodeficiency virus (HIV)

Percutaneous exposure	0.05 - 0.4%
Mucocutaneous exposure	0.006- 0.05%

Hepatitis B virus (HBV)

Percutaneous exposure	9-30%
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Hepatitis C virus (HCV)

Percutaneous exposure	3-10%
-----------------------	-------

Surveillance:

The setting of an effective infection control programme requires information on occupational exposure and the prevalence of disease and factors related to it. Such information can be obtained through surveillance by assessing the magnitude of the problem and detecting change in the incidence rate over a period of time.

Prevalence will reflect the magnitude of the problem at a specific time or period and this can be calculated by counting the number of patients who have acquired infection in the health care setting at the time of survey divided by the total number of patients present at that time. It is relatively simple and more reliable when compared with other methods, but it does not reflect changes in disease incidence unless repeated surveys have been done. Surveillance data are essential for developing and revising infection control policies and procedures.

Infections in the health care setting can occur in the form of outbreaks, when evidence shows that there is cluster of a particular type of infection in a certain group of people or a significant increase in the incidence of an infection or site of an infection. Attempts to contain an outbreak should begin with an investigation to find the cause of the outbreak. Data on time, place and persons should be collected and analyzed. Samples should be collected as appropriate for microbiological investigations. Environmental samples are usually not valuable unless there is evidence that they are relevant. Empirical intervention measures have to be implemented initially and specific measures must be carried out when the cause of the outbreak has been identified. Outbreaks often arise from faulty techniques, procedures, defective disinfection or sterilization and contamination of pre-sterilized equipment.

Principles of Infection control :

The infections acquired in health care setting can be greatly minimised by observing some simple precautions. The broad principles of infection control include the following :

- **Infection control policy and program:** Each institution should establish an appropriate infection control (IC) policy and programme. A mechanism should be set up for planning, implementing, monitoring and evaluation of the IC program. Preventive measures are essential and very cost effective, but are often overlooked and considered unnecessary by health care workers. Medical institutions are encouraged to set up an IC program suitable for its requirements and resources. For example, hand washing is the most simple and cost-effective measure and must be encouraged. Disinfectant should be prepared and used according to the guidelines. Antimicrobials should be prescribed rationally according to the guidelines to reduce bacterial resistance and side effects.
- **Rationalisation of Patient admission:** Patient should not be admitted into a hospital unless it is absolutely necessary and he/she should be discharged as early as possible, to reduce the risk of infection. Patients with communicable diseases such as cholera should be isolated as appropriate to reduce the risk of transmission to others.
- **Disinfection:** Health care facilities should be kept clean and devoid of virulent organisms by proper house keeping. Cleaning of premises and room floors with water and detergent is recommended. Cleaning with a disinfectant is usually not necessary unless there is a spillage with potentially infectious material. Architectural design of a health care facility should permit good ventilation. It is always necessary to maintain ambient temperature of the work place between 20-25 °C. Extra-measures to decontaminate air in a health care setting are costly and have limited value in infection control. Positive or negative pressure ventilation is indicated in certain areas, but again is expensive and is not superior to practices which ensure a clean and hygienic environment.
- **Disposal of hazardous Hospital waste:** Proper waste disposal, water treatment, disinfection and sterilization of equipment can reduce the risk of infection among patients, health care providers and community.
- **Training of health care provider:** The health care providers need to be trained on the infection control measures that need to be adopted in his/her health facility. Specific measures are required to be taken against microorganisms that may originate from patients or health care workers to prevent their spread.

Procedures carrying potential risks of HIV, HBV and other bloodborne agents

Procedure	Person at risk	Mode of transmission
Collection of blood sample	Patient Health worker	<ul style="list-style-type: none"> Contaminated needle, Contaminated hands or gloves of health worker Skin puncture by needle or broken specimen container Contamination of hands by blood
Transfer of specimens (within laboratory)	Laboratory personnel/ transport worker	<ul style="list-style-type: none"> Contaminated exterior of specimen container Broken container Spill or splash of specimen
HIV serology and virology	Laboratory personnel	<ul style="list-style-type: none"> Skin puncture or contamination of skin or mucous membrane Contaminated exterior of specimen container Contaminated work surface Spill or splash of specimen Broken specimen container Perforated gloves
Cleaning and maintenance	Laboratory personnel Support staff	<ul style="list-style-type: none"> Skin puncture or skin contamination Spills or splashes Contaminated work surface
Waste disposal	Laboratory Personnel Support Staff Transport Worker	<ul style="list-style-type: none"> Contact with contaminated waste Puncture wounds and cuts
Shipment of specimens (to other centers)	Transport worker Postal worker	<ul style="list-style-type: none"> Broken or leaking specimen containers and packages

Components of Hospital Infection Control Program

1. Infection Control Team (ICT)

Constitution of the Team:

The Head of Institution (The Director/ Dean/ Principal, as the case may be in teaching institutions) or the Chief Medical Officer of the District will be the Chairperson of the Team. The Chairperson of the Hospital Infection Control Committee shall be the member-secretary. All members of Hospital Infection Control Committee, including Hospital Infection Control Officer, the Infection Control Nurse will also be the member of the team. Other special invitees may be the Medical Superintendent, the nursing superintendent, the administrator of Institution or the District Collector's representative in Districts, head of engineering services, the sanitary officer, the District Health Officer/ Municipal Health Officer (as no infection shall remain confined to the hospital premises only) and even the security officer.

Functions:

The team is responsible for the day to day decision on infection control and should meet frequently preferably monthly. The team should be adequately funded to provide secretarial assistance, training material and to allow members to attend courses and professional meetings. The team will be monitoring body and make appropriate arrangements for guidance and implementation of the action plans time-to-time suggested by the Hospital Infection Control Committee. The team will monitor the following:

- (I) Whether the recommendations made by Hospital Infection Control Committee are implemented in time and to its perfection.
- (II) If not, what were the reasons/drawbacks.
- (III) Whether non-implementation of Hospital Infection Control Committee recommendations were due to non-coordination of various participating departments/sections, or due to financial constraints or otherwise.
- (IV) What corrective specific measures have been taken by the default.

2. Infection Control Committee

Chairman & Members of the Committee:

The committee is an important part of good infection control practice and must be seen to function efficiently. It should be represented by key personnel from the different departments of the hospital. The committee ideally be headed by a senior medical Microbiologist. The committee and its chairman should act as a co-ordinator between departments responsible for patient care and supportive departments (e.g. Hospital administration, Pharmacy, Maintenance, Sanitation etc).

Functions of ICC:

The main aim of ICC should be to improve hospital Infection Control practices and recommend appropriate policies thereby reducing unnecessary use of antibiotics and minimise hospital bed occupancy due to post-operative hospital acquired infections. These policies may be reviewed from time to time.

In order to have good infection control measures in a health care setting the following measures may be taken-

- (1) Ensure that facilities are available to the hospital personnel to maintain good infection control practices.
- (2) Establish standards for the procedures or systems used for identifying the infectious organisms within the hospital.
- (3) Maintain an ongoing educational programme for all hospital personnel in the use of such standards.
- (4) Establish objectives for the hospital in areas of infection control measures by identifying problems and framing time bound action plan.
- (5) Monitor health of health care providers and others working in the hospital in collaboration with the occupational health department, if available, to prevent spread of infection from them to patients.
- (6) Monitor the rational use of antibiotics.
- (7) Monitor the use of disinfectants, sterilization practices and frequency of hospital cleaning etc.

3. Infection Control Officer (I.C.O.)

This person should preferably be a senior member of the hospital staff: most preferably a senior medical microbiologist, epidemiologist or infectious diseases physician, with some experience and training in infection control. In the absence of one of these a surgeon, pediatrician or other appropriate physician with special interest in the field could be appointed. He/she should be the chairperson of the infection control committee and is responsible to the Hospital manager or Medical Director for infection control in the hospital.

The main role of the ICO is to act as a liaison between the medical staff and the ICT and to promote the Infection Control Programme (ICP). Medical superintendents should preferably not take this challenging technical responsibility as they are usually preoccupied with other responsibilities.

4. Infection Control Nurse (ICN):

The Infection Control Nurse should be able to function as a clinical nursing specialist. The duties of the ICN is primarily associated with IC practices with special responsibility for nursing problems and education. Although the recommendation is that one nurse or practitioner is required for 250 beds on a full time basis, however, this is often not possible. Therefore, in a large hospital the ICN can train another ward - based nurse or person to maintain infection control within his/her ward. This person would then be the "link" between the ICN and the ward in identifying problems and implementing the remedial measures. The basic qualification for a ICN should be that of a Registered nurse (or equivalent person) with clinical and administrative expertise and has been adequately trained in hospital infection control programme. Good interpersonal and educational skills are important for the effective implementation of infection control measures in health care settings.

1. Infrastructure and Facilities required for hospital infection Control:

The hospital personnel should be provided with minimum essential facilities to prevent hospital acquired infections. A model for routine Microbiology laboratory is described as an example.

- I. Proper ventilation** - The laboratory in which any infectious organism or specimen is handled, should have proper ventilation. The air- flow should also be unidirectional and preferably from less contaminated to more contaminated. It will not only minimise the chances of infection in health care worker but also improve the quality of test results.
- II. Proper furniture** - Furniture should not be broken as it might injure the worker and may lead to wound infections.
- III. Proper Ambient temperature** - Proper ambient temperature is crucial. It is not essential only for quality assurance or microbiological results and work efficiency of the workers, but also for preventing hospital infection control. No laboratory worker should sweat while working with pathogenic organisms as mopping of sweat may cause cross contamination and laboratory acquired infection. To prevent these risks all laboratories or the work places where microbiological/serological work is undertaken such as TB an HIV testing laboratory should have window or centralised airconditioners. The air coolers should not be installed which create high humidity and thus facilitate transmission of infection.

2. Standard operational Procedures -

All laboratories should have preferably the standard operational manuals for all techniques/procedures.

3. Educational programmes for hospital personnel -

All hospitals /laboratories must conduct educational programmes time-to-time for their workers. These personnel should also be encouraged to undergo various courses to update knowledge (such as HIV testing, quality control etc.) and recent advances in their fields.

4. Objectives of the hospital/laboratory -

All hospitals and their subordinates departments should have clear objectives in respect to infection control measures by identifying problem areas to their working environment. They should also organise action taken meeting on these problems time-to-time.

5. Health of Staff -

It is mandatory for all hospitals to monitor the health of their workers time-to-time. It is not important only for worker's point of view but also for employers point of view (as the advanced disease may be difficult or very expensive to treat) and to avoid hospital acquired infections from the infected personnel to other fellows/patients. It is advisable that the base line serum samples are collected from personnel engaged in infectious diseases laboratories/wards and stored for determining the base line antibody titres. This may be very important in personnel who are working with HIV, Hepatitis B and C viruses, Tuberculosis, *Toxoplasma gondii*, Brucella etc.

6. Rational Use of Antibiotics -

The Hospital Infection control Committee should be empowered to decide the indent of antibiotics. This decision should be taken on the basis of current antibiograms of the hospital isolates.

7. Use of disinfectants and hospital waste management -

The Hospital Infection control Committee should also be the monitoring authority for in-use disinfectants. This committee should also look after the sanitation and central sterilisation departments (if exist) and formulate proper hospital waste management guidelines.

AN INFECTION CONTROL INDICATOR CHECKLIST

Indicator 1

Sharps are handled safely to minimize the risk of sharps injury

- ✓ Appropriate puncture-proof sharps container.
- ✓ Container less than three-quarters full.
- ✓ Sharps are not protruding from container.
- ✓ No recapping or one-hand recapping of needle & syringe

Indicator 2

Instruments decontaminated fully

- ✓ Sterilizer available and in good working order
- ✓ Equipment thoroughly cleaned after use.
- ✓ Clean instruments are stored in cupboards.

Indicator 3

Hands are washed appropriately to prevent cross infection

- ✓ Soap and clean water available.
- ✓ Clean towels available.
- ✓ Staff observed to wash and dry hands after contact with body fluid, removal of gloves and contact with patients.

Indicator 4

A protective barrier is worn to prevent exposure to blood

- ✓ The following protective barriers are available for use by staff
(depending on the clinical area and risk of exposure)
- ✓ Disposable gloves
- ✓ heavy duty gloves
- ✓ masks
- ✓ aprons
- ✓ protective eye wears

Indicator 5

Waste disposal safety

- ✓ Evidence of deep burial or incineration regularly
- ✓ No contaminated waste visible.

Safety Measures For General Procedures

3.1 Hands Washing and Decontamination

Hand washing is the most effective method for preventing the transfer of infection between health care personnel and patients within the hospital. Pathogenic organisms from colonized and infected patients are carried on the hands of staff and represent an important mode of spread of infection in the hospital. The Microbial Flora that is present on the Skin are :

Resident flora - Organisms like Coagulase Negative *Staphylococci*, Diphtheroids, and *Candida* survive and multiply in the superficial skin layers.

Transient flora - This represents recent contaminants which usually survive only for a limited period of time. They can be pathogens like *E.coli* or *S. aureus* acquired from colonized or infected patients or from inanimate hospital environment and may cause nosocomial infection.

There are various methods of Decontamination of Hands.

I. **Social hand washing:** with plain soap and water removes most transient micro-organisms from moderately soiled hands. It is required:



Figure 1

- Before handling food, eating, and feeding the patient.
- After visiting the toilet.
- Before and after nursing the patient (e.g. bathing, bedmaking).
- Whenever hands are soiled.

{Note- Hand-washing is generally not needed following contact with the patient (e.g. taking blood pressure)}.

II. Hygienic hand-washing

Hygienic hand washing or disinfection is a procedure where an antiseptic detergent preparation is used for washing of hands or is disinfected with alcohol. A thorough hand wash may be appropriate if disinfectants are not available. It should be done:

- a. Before performing invasive procedures.
- b. Before caring for susceptible patients (immunocompromised).
- c. Before and after use of gloves.
- d. After contact with blood secretions or following situations in which microbial contamination is likely to occur.

III. Surgical hand washing: is performed with the aim to remove and kill the transient flora and to decrease the resident organisms to prevent the risk of wound contamination when gloves are damaged. Agents are the same as for the hygienic hand-washing.

A defined technique for decontamination of hands is probably of greater importance than the detergent used.



Figure 2 : Hygienic hand washing



Figure 3: Surgical Hand washings

Methods

1. Social hand-washing

In social hand-washing, vigorous and mechanical friction is applied to all surfaces of hands using plain soap and water for at least 10 seconds using a defined technique; the hands are rinsed under a stream of water and dried with paper towel. In the absence of running water, a clean bowl of water should be used for hand-washing purposes. The bowl should be cleaned and water changed between each use. Alternatively, a drum with a drain spout could be elevated to serve as running water. Similarly, in the absence of paper towels, a clean cloth should be used (e.g. measuring 12" x 12"), for individual drying of hands. It should be remembered that the towel should not be used for common use and should be discarded after each use into a bag specifically meant for the towels for laundering and reuse. In places where there is frequent disruption of water supply, it is necessary to store water in large receptacles wherever a water supply is available. This can be used during periods of scarcity of water. The water should be free from pathogens such as cholera.

2. Hygienic hand-washing or disinfection

This is hand-washing using a disinfectant. The agents used are-

Aqueous

- 4% chlorhexidine gluconate/ detergent solution.
- Povidone-iodine/ detergent solution containing 0.75% available iodine.
- Wet hands with clean (running) water or, if not available, from water in a bowl, apply cleanser (3-5 ml) depending on the product or thoroughly lather with soap. Wash the hands for 10-15 seconds, applying over all hand surfaces, rinse and dry.

Alcohol

- 0.5 % chlorhexidine or povidone-iodine in 70% isopropanol or ethanol, 60% isopropanol or 70% ethanol with emollient (e.g. 0.5% glycerol).

3. Surgical Hand-washing:

Surgical hand washing is done before surgical procedures or interventions. In surgical hand-washing usually no disinfectant other than soap/detergent is used however, the scrubbing of hands and finger -nails is very crucial. The hands should be scrubbed at least twice with warm water. In surgical washing not only fingers and palms are washed but hands upto elbow are washed. After washing the water should not drip down from unwashed area of arm to washed hands. To assure this, hands are kept in upright position folded at elbow. After drying the surgeon must put on gown and gloves.

3.2 Standard precautions

Certain standard precautions are needed to be followed in all health care settings. These are -

- Wash hands before and after all patients or specimen contact.
- Handle the blood of all patients as potentially infectious.
- Wear gloves for potential contact with blood and body fluids.
- Place used syringes immediately in nearby impermeable container; DO NOT recap or manipulate needle in any way.
- Wear protective eyewear and mask if splatter with blood or body fluids is possible (e.g., bronchoscopy, oral surgery etc).

- Wear gowns when splash with blood or body fluids is anticipated.
- Handle all linen soiled with blood and / or body secretion as potentially infectious.
- Process all laboratory specimens as potentially infectious.
- Wear mask for TB and other respiratory organisms (HIV is not airborne).

3.3 Protective material

• DRESSINGS

Water-proof strongly adhesive plastic dressings for break in skin and to seal off areas that are oozing blood

• GLOVES

Disposable vinyl (in all patient care areas)

latex surgical (for invasive procedures)

heavy duty rubber till elbows (for cleaners)

• MASKS

To prevent against aerosols and splashes

• PROTECTIVE GLASSES OR EYE SHIELDS OF TRANSPARENT MATERIAL.

• PLASTIC APRONS

To be worn outside clothing to protect against splashes, can be worn beneath gowns when heavy contamination is suspected.



Figure 4

Water-proof strongly adhesive plastic dressings for break in skin and to seal off areas that are oozing blood



Figure 5

ALL LABORATORY WORKERS SHOULD PRACTICE UNIVERSAL PRECAUTIONS USING PROTECTIVE BARRIERS. IF SPLASHES ARE ANTICIPATED WEAR EYE GLASSES AND MASKS. NEVER USE MOUTH PIPETTES.

3.4 Selection of protective barriers

Type of exposure	Protective barriers	Examples
<i>Low risk</i> Contact skin, no visible blood	<ul style="list-style-type: none">· Gloves helpful but not essential	Injections, minor wound dressing
<i>Medium risk</i> Probable contact with blood, splashing unlikely	<ul style="list-style-type: none">· Gloves· Gowns and apron may be necessary	Vaginal examination, insertion or removal of intravenous cannula, handling of laboratory specimens, large open wounds dressing, venepuncture spills of blood
<i>High risk</i> Probable contact with blood, splashing uncontrolled bleeding	<ul style="list-style-type: none">· Gloves· Waterproof gown or apron· Eye wear· Mask	Major surgical procedures particularly in orthopedic surgery and oral surgery, vaginal delivery

3.4 GUIDELINES FOR COLLECTION OF BLOOD SAMPLES

- Use gloves and take special care if there are cuts or scratches on the hands.
- Take care to avoid contamination of hands and surrounding area with the blood.
- Use disposable/ autoclaved syringes and needles.
- Use 70% ethanol or isopropyl alcohol swabs/sponges for cleaning the site of needle puncture.
- Use thick dressing pad or absorbent cotton below the forearm when drawing blood and tourniquet above.
- Tourniquet must be removed before the needle is withdrawn.
- Place dry cotton-swab and flex the elbow to keep this in place till bleeding stops.
- Place used needles and syringes in a puncture resistant container containing disinfectant.
- Do not recap used needles.



Figure 6
**NEVER BLEED A
 PATIENT WITH
 UNGLOVED HANDS.
 NEVER LEAVE THE
 SAMPLE CONTAINERS
 WITH BLOOD SAMPLE
 OPEN**



Figure 7

While bleeding the patient, use all protective barriers and keep appropriate disinfectant alongside. It is important that patient is counselled properly so that patient does not reflex involuntarily.



Figure 8
NEVER HANDLE THE BLOOD SAMPLES WITH UNGLOVED HANDS.



Figure 9
DO NOT PUT BLOOD SAMPLES ON THE LABORATORY REQUEST FORMS.



Figure 10
NEVER SEPARATE SERUM FROM BLOOD WITHOUT GLOVES
(This photograph was taken in pre-HIV era).



Figure 11
DO NOT SOIL THE LABORATORY SLIPS WITH BLOOD/BODY FLUIDS.
THE LABORATORY TECHNICIAN MUST NOT ACCEPT SUCH LABORATORY SLIPS.

- x. Do not remove needles from syringes.
- xi. Use disposable screw-capped vials to avoid risk of leakage, breakage or spills.
- xii. Seal specimen containers securely. Wipe off the exterior of the container free of any blood with a disinfectant.
- xiii. These vials should preferably be placed in small plastic bags which should be appropriately tied.
- xiv. Plastic 'bread boxes' with proper 'caution' labels should be used for transporting the specimen to the laboratory.
- xv. Wash hands following completion of blood collection.
- xvi. In the event of needle stick/ other skin puncture/ wound, wash thoroughly with soap and water and let blood flow freely. Then apply Iodophor/ Tincture of iodine.(Ref. Chap on Post exposure prophylaxis)
- xvii. All subjects contaminated with blood must be regarded as infectious.
- xviii. Report all accidental exposure to the authorities.
- xix. No paper work to be done on potentially contaminated surfaces.
- xx. Label all specimens carefully without soiling the test request forms.
- xxi. Decontaminate by autoclaving all potentially contaminated material used in the laboratory before disposal or discard in a bucket containing sodium hypochlorite solution.

3.6 Rational injection practices

Reducing unnecessary injections and suturing and limiting blood transfusions are essential for reducing infections through blood-borne route. Injections should be used when absolutely indicated. This practice can substantially reduce the reuse of needles, particularly in situations where the supply of sterile needle is limited or where instrument cannot be easily or effectively sterilized. As a part of national policy, injection of antibiotics should be avoided if an equally effective preparation is available for oral administration or if one injection can be given instead of multiple doses. For example, streptomycin injection for treatment of TB is not usually recommended since TB treatment is now based on short course chemotherapy consisting of four drugs, all given orally.

Adequate number of sterile syringes and needles must be arranged. Boiling or autoclaving of re-usable syringes and needles for reusing during an injection session must be avoided.

There is no need to wear gloves when giving injections.



Figure 12
Needles or other sharps should never be passed directly from one person to another.
ALWAYS USE STERILE TRAYS AND FORCEPS.



Figure 13
During blood collection patient should sit comfortably and all paraphernalia of blood collection should be on the bleeding table

Figure 14
After the blood /clinical sample has been collected the syringes/other instruments should immediately be submerged in the disinfectant.



Figure 15
The used needles must be destroyed in needle-cutters.



Figure 16
NEVER RECAP THE USED NEEDLES BY
USING BOTH HANDS

Handling Syringes and Needles

Do's

- Pass syringes & needles in a tray
Preferably cut it with needle Cutters
- Put needle & syringes in 2% hypochlorite solution if needle cutter is not available
- Remove cap of needle near the site of use
- Pick up open needle from tray/drum with forceps
- Destroy syringes by burning their tips/ or if cutters not available

Don'ts

- Never pass syringe & needle on directly to next person
- Do not bent/or break used needle with hands
- Never test the fineness of the needle's tip before use with bare or gloved hand.
- Never pick up open needle by hand
- Never dispose it off by breaking it with hammer/stone

Good Practice For The Safe Handling And Disposal Of Sharps

- **ALWAYS** dispose of your own sharps.
- **NEVER** pass used sharps directly from one person to another.
- During exposure-prone procedure, the risk of injury should be minimized by ensuring that the operator has the best possible visibility, e.g. by positioning the patient, adjusting good light source and controlling bleeding (see Photograph).
- Protect fingers from injury by using forceps instead of fingers for guiding suturing.
- **NEVER** recap, bend or break disposable needles.
- Directly after use, place needles and syringes in a rigid container until ready for disposal.
- Locate sharps disposal containers close to the point of use, e.g., in patient's room, on the medicine trolley and in treatment room etc.



Figure 17

*ALWAYS TRANSPORT THE BLOOD SAMPLES IN UNBREAKABLE CONTAINERS.
THE GLASS TUBES MAY BREAK AND CONTAMINATE THE FLOORS*



Figure 18

If by some reason the blood has fallen on floor, the blood spot must be covered with tissue paper/towel and soaked with disinfectant and left for 30 minute.

- Dispose used sharps in a puncture- resistant container.

NEVER place used sharps in other waste containers.

- Keeps all sharps and sharps disposal containers out of the reach of children.
- Prevent overflow by sending sharps disposal containers for decontamination or incineration when three-quarters full.

3.7 FNAC (Fine needle aspiration cytology)

Procedure for FNAC carried out for enlarged masses should be performed carefully, holding the mass with fingers. Needle should be put in such a way that it does not injure the fingers.

3.8 Dressing Of Wounds

Wounds can be surgical after operations, accidental after injury or due to purulent infections (boils, abscess, carbuncles etc.) or due to underlying diseases like fistula, piles. These wounds require dressings for proper healing and prevention of super infection. In all cases, the continuity of the skin/mucous membrane is broken and any thing used for the dressings if contaminated may cause infection. Only sterile instruments and material (cotton wool and other dressing material) should be used. Antiseptic lotions and anti-bacterial creams must also be used.

All materials and instruments used and removed during the dressing should be disinfected. Reusable instruments must also be decontaminated before sterilization and disposal instruments before disposal. It is necessary that Universal precautions are followed.

3.9 Laundry

The washing of linen can be manual by 'dhobies' or mechanical by washing machine. Special care is necessary when washing is done by 'dhobies'. The linen used by the patients, doctors and paramedical staff may be 'clean' or 'contaminated' (when soiled with blood/pus/urine/faeces or any other body fluids).

The contaminated linen must be disinfected before giving to laundries for washing. The disinfection can be done by chemical disinfectant or by boiling or autoclaving at low pressure of steam. Hence the facilities for disinfection of contaminated soiled linen should be available in the hospital near the discarding of contaminated linen.

Both the 'clean (less contaminated)' and 'contaminated' linen should be transported to laundry separately in thick polythene bags of different colors. The clean contaminated linen can be transported in thick cotton bags also.



Figure 19

After 30 minutes the sanitation staff puts on heavy-duty gloves and mopes the blood spot along with disinfectant.



Figure 20

Finally the floor is cleaned with detergent and water in a usual way.

If the washing is done mechanically by washing machine, the decontamination of contaminated soiled linen can be done in the laundry itself with hot detergent in the washing machine.

Handling, separating and counting of even clean contaminated linen is hazardous, hence, there should be minimum handling.

All attempts should be made to provide suitable washing machine with built in cycle for decontamination.

Drying of the linen in the sun after washing should be discouraged as it is usually spread in the roadside or other contaminated area. After drying all linen should preferably be autoclaved before issued to the patient or hospital personnel to wear.

Decontamination and washing of blankets

The cotton and acrylic/synthetic blankets are preferred to woolen blankets since they can be easily decontaminated when soiled and washing is also cheap and easy. They can be handled like linen. Contaminated soiled woolen blankets can be decontaminated either by exposing to formaldehyde vapours or autoclaving. Liquid disinfectant may damage woolen blankets. Dry cleaning of the blankets does not inactivate or kill HIV.

Decontamination and washing of Mattresses

It is advisable to cover all mattresses with waterproof synthetic material like Rexene or plastic. This makes the disinfection of the mattresses easier. Washing can be done manually .

3.10 Management of Spills

Spills on the floor, of infected or potentially infected material should be covered with paper towel/blotting paper/ newspaper.

1% Sodium-hypochlorite solution (giving 10,000 ppm of chlorine) must be poured on and around the spill area and covered with paper.

It is very essential to keep it covered for about 10 minutes.

After 10 minutes, the paper should be removed with gloved hands and discarded in infectious waste, which is incinerated.



Figure 21
For household purposes ordinary bleach may be used.



Figure 22
2% Glutaraldehyde (CIDEX)

Recommended dilutions of chlorine releasing compounds

	Clean condition (e.g. cleaned medical equipment)	Dirty condition (e.g. blood spills soiled equipment)
Available chlorine required	0.1% (1 g/litre = 1000 ppm)	1% (10 g/litre = 10000 ppm)
If 5% stock	Dil 1:50	Dil 1:5
10% stock	Dil 1:100	Dil 1:10
Dilution		
Sodium hypochlorite solution (5% available chlorine)	20 ml/litre	100 ml/litre
Calcium hypochlorite (70% available chlorine)	1.4 g/litre	7.0 g/litre
NaOCl (60% available chlorine)	1.7 g/litre	8.5 g/litre
NaOCl based tablets (1.5 g of available chlorine per tablet)	1 tablet/litre	4 tablets/litre
Chloramine (25% available Chlorine)	20 g/litre	20 g/litre or 40 g/litre

Household bleach contains 4-5% of available chlorine, that may also be used after diluting so as to have 1% available chlorine. Minimum contact time of 30 minutes is recommended.

Other chemical disinfectants effective in inactivating HIV:

Ethanol 70%	=	3-5 min.
2-propanol 70% (isopropyl alcohol)	=	3-5 min
Povidone iodine 2%	=	15 min.
Formaline 4%	=	30 min.
Gluteraldehyde 2% (CIDEX)	=	30 min.
Hydrogen Peroxide 6%	=	30 min.

SAFETY MEASURES FOR SPECIAL PROCEDURES

4.1 Urinary Catheterisation

Urinary Tract Infections may be the most frequent of nosocomial infections. These are prevented by reducing unnecessary and inappropriately prolonged use of drainage devices and by the use of closed drainage systems and standard aseptic technique. Urinary catheterization is an aseptic procedure but is a common cause of bacteremia due to micro or macro trauma caused at the time of insertion or removal. Therefore, **think twice before using a urinary catheter.**

Procedure:

The following steps may be followed while catheterising a patient -

- Inform the patient of the reasons for catheterization and explain the details of procedure.
- Collect all the requisites equipment and material required.
- Scrub hands thoroughly with soap and water.
- Select a catheter that fits the urethra without traumatizing the patient.
- If the patient is male, foreskin of penis is withdrawn and in case of females secretions are cleared with sterile water and never with spirit/disinfectants.
- Sterile xylocaine jelly is squeezed into the urethra, and wait for a while till mucosa is anaesthetised.
- Advance the catheter into the meatus by gripping through inner plastic sleeve of covering. Do not directly touch the catheter.
- Once the catheter is inside the bladder, urine starts coming. Collect the urine in a suitable container.
- Fill the balloon with 5-10 ml sterile water, for its retention inside the bladder (Foley's catheter).
- Anchor the catheter to the patients thigh with leucoplast.
- Connect up the urine drainage and hang it below the level of the bed to stop reflux.
- Wash hands with soap and water.

It is important to use the correct urinary catheter for the condition. Foley's catheter requires no more than 5-10 ml water, while haemostasis catheter require 30 ml. The balloon can cause obstruction and stasis of the urine if it is too large, thus increasing the risk of infection.

1.2 INTRAVENOUS (I.V.) CANNULATION/ CATHETER ASSOCIATED INFECTION

Indications for IV cannulation or catheterisation should be strictly followed.(e.g. severe dehydration, blood transfusion or parenteral feeding) Alternative routes may be tried for minimal dehydration or for parenteral therapy. Following are the factors that lead to infection during cannulation/catheterisation-

Infections related to equipment and fluids:

- Cannula material that itself is thrombogenic, e.g. polyethylene and polypropylene which is more reactive than Teflon which in turn is more reactive than steel or silicon coated Teflon.
- Contaminated administration sets or fluids.
- Contaminated hypodermic needle used as air inlets.
- Disconnected i.v. cannulas also may act as source of aerial influx.
- 3-way stop clocks in the cannula.
- Contaminated splints used for sprained/operated joints.
- Large bandages over the insertion site (contaminated by patient's blood and fluids).

Infections related to the insertion of devices and its duration:

- Skin flora and inadequate disinfection.
- Skin flora/transient flora of staff / other patients/visitors.
- Contaminated disinfectants.
- Unstable cannulas - movement increases the risk of bacterial contamination.
- If IV infusion is to be given for over 72 hours, alternate arms should be used for I.V. therapy for longer than 72 hours.
- Pre-existing infection/venous thrombus/septic focus.

4.3 Surgical Procedure

All the surgical procedures including dental procedures are invasive procedures breaking the continuity of skin and/or mucous membrane. There is lot of handling of blood, tissues, organs and body fluids during these procedures.

Floors / surfaces (tables tops, floor, light, walls etc.), material (sponges, swabs), linen (mask, gown, caps etc.), equipment, instruments, gloves and other articles used during surgery get contaminated with blood or body fluids or blood contaminated material like pus and tissue etc. and must be disinfected before sterilisation or disposal.

Any surface which has been contaminated with the blood or body fluid must be disinfected first by covering it with absorbent material. Disinfectant fluids should first be poured around the contaminated area and then over the absorbent material and left for more than 10 minutes.

Tissues, organs and any part of the body removed during surgery should be buried deep with bleach or lime. Blood and body fluids removed during operation must be disinfected before disposal.

4.4 Non-invasive procedures

These include vaginal, anal and rectal examinations, prostatic massage, measurement of intra-ocular pressure, tracheal, laryngeal, throat and nasal examinations and different imaging processes like echo-cardiography, ultra sound, X-ray and CAT scan. It is highly possible that during some of these non-invasive procedures, break in the continuity of mucous membrane may be encountered which may result in contamination of instruments used for the examination. The blood and the body secretions may act as a source of infection for number of diseases including AIDS and Hepatitis. Further, if unsterile instruments have been used they may infect the patient.

The vaginal and rectal examinations are particularly hazardous. Since HIV and other organisms including those causing sexually transmitted disease may be present in these situations. Therefore, only sterile instruments, equipment or material should be used for such non-invasive procedures. After use they must be regarded as 'contaminated' and must not be used on other patients without proper disinfection and sterilization.

Disinfection of the instruments for Non-invasive Procedures

Immediately after use the instruments (like vaginal speculum, proctoscope, nasal speculum and instruments used for laryngeal and tracheal examination), should be immersed in suitable disinfectant fluid for at least 20 minutes. After disinfection, they may be washed/rinsed with water and preferably autoclaved. In case of non-availability of autoclave facility due to workload or other reasons, the instruments used for non-invasive procedures can be boiled for 20 minutes and then reused. A high level of disinfection of the instruments and equipment can be achieved by continuous boiling for 20 to 30 minutes.



Figure 23

The clinical samples must be transported in spill proof screw capped tubes (not in penicillin vials) and in covered plastic boxes



Figure 24

Blood samples container should never be opened without gloves.

4.5 Laboratory Investigations

The clinical specimens are collected for different laboratory tests/ investigations. Most of these specimens are highly infective and on occasions can cause life threatening disease like Hepatitis and AIDS. Hence, great care must be taken in handling these specimens which include collection, transportation, processing, discarding and disposal of these specimens. These specimens primarily fall in three categories:

- (a) Blood, tissue and blood contaminated material like pus and body fluids etc.
- (b) Body fluids like CSF, pleural and pericardial fluid, semen, vaginal fluid and other such specimen.
- (c) Urine, sputum, bronchial washings and swabs from mucous membrane and skin.

Blood and blood contaminated material and tissues are the most hazardous specimens and can be the source of fatal infections. The following recommendations will be useful for handling these clinical specimens:

(A) Blood, tissue and blood contaminated material:

Only autoclaved/pre-sterilized disposable needles and syringes must be used for collection of blood. All precautions described for giving injections should be followed strictly for collection of blood including disinfection of skin. In case of collection of blood by finger prick, only autoclaved/pre-sterilized disposable lancet should be used. Use of injection needles and stitching needles should be avoided. Cutting needles can be used.

Only autoclaved/pre-sterilized disposable instruments should be used for FNAC to remove the tissue or blood contaminated material like pus and body fluids. Precautions for discarding, autoclaving and disposal of the instruments used for collection of material are the same as for needles and syringes.

(B) For Body fluids like pleural, pericardial and cerebro-spinal fluid and vaginal secretions etc:

Only autoclaved or pre-sterilized disposable instruments should be used for collecting these material for laboratory investigations.

(C) Urine, semen, sputum, bronchial secretions and swabs from mucous membrane:

Most of these specimens are excretions of the body and do not require use of any equipment or instrument for their collection, except bronchial secretions and rarely urine. Only autoclaved or presterilised disposable instruments or material should be used if the material to be collected is not available as excretion.

4.5.1. Transportation of Clinical Specimen

All clinical specimens should be regarded as potentially infectious and should be transferred to the laboratory in spill proof screw capped tubes. Special precautions should be taken for the blood suspected to be from patients of Hepatitis or AIDS, which should be transported in leak proof polythene bags. All the specimens

must be properly labeled and placed in a double chambered packet. The sample should be accompanied by requisition forms, which must not get contaminated by the clinical specimen.

Any accident, contamination or spill from the collection to disposal must be reported and proper disinfection should be carried out.

4.5.2. Processing of Clinical Specimens

All the clinical specimens specially semen, blood and blood contaminated material must be regarded as infection hazard irrespective of the fact what test and in which laboratory the tests are to be performed. Any sample of blood can be positive for Hepatitis virus and HIV. The blood, blood-contaminated specimens and tissue must not spill on the table tops, floor, requisition forms.

The risk of laboratory acquired infection occurs primarily from contamination of the hands and mucous membranes of the eyes, nose, and mouth by infectious blood and other body fluids. Various procedures in the laboratory settings carry a risk of potential HIV, HBV and other blood borne agents. There is no evidence that HIV or HBV are transmitted by the air borne route. Current studies indicate that the HIV infection rate for laboratory workers is low. The risk of HIV infection following percutaneous needle-stick exposure to HIV-contaminated blood is estimated to be 0.4%. In contrast, the risk of HBV infection following similar exposure to that virus is several times as great. While the level of occupational risk is low, the consequences of infection with HIV and HBV are dire and should not be under-rated by laboratory personnel. So far, there is no vaccine against HIV and safe work practices provide the only protection.

The role of training in laboratory safety is vital. While continual on the job training in safety measures is essential for all laboratory and support staff, poor laboratory practice and human error violate the safety standards and render good equipment hazardous.

4.6. Standard Biosafety Guidelines

The guidelines given here outline the basic practices and procedures designed to keep laboratory accidents to a minimum.

- Prevention of puncture wounds, cuts and abrasions and protection of existing wounds, skin lesions, conjunctiva and surfaces.
- Appliances of simple protective measures designed to prevent contamination of the person and his/her clothing.
- Good basic hygienic maintenance including regular hand washing.
- Safe disposal of contaminated waste.

Besides, there are certain Standard biosafety regulations for laboratory workers which needs to be followed carefully. They are as follows:

- Wear gloves when handling infectious materials or where there is a possibility of exposure to blood or other body fluids. All laboratories that work with material that is potentially infected with HIV require a generous supply of good quality gloves.
- Discard gloves whenever they are thought to have become contaminated or perforated and wash your hands, and put on new gloves.
- Do not leave the workplace or walk around the laboratory while wearing gloves.
- Wash hands with soap and water immediately after any contamination and after work is finished. If gloves are worn, wash hands with soap and water after removing the gloves.
- Wear a laboratory gown, or uniform when in the laboratory. Wrap-around gowns are preferable. Remove this protective clothing before leaving the laboratory.
- When work with material that is potentially infected with HIV is in progress, close the laboratory door and restrict access to the laboratory. The door should have a sign:.
- Never open blood sample containers without gloves (as was practiced in pre-HIV era as shown in the Photograph 10).

4.7 Vaginal Delivery

The delivery room is another area, where the health professional is exposed to potentially infected material. Strict precaution is necessary to be advocated while conducting a vaginal delivery. The following guidelines is to be kept in mind-

- Always keep delivery tray ready with linen & cord tape
- Never deliver a woman without gloved hand (even for emergency such as taxi delivery/toilet delivery)
- Never keep sharp instruments around perineum on delivery table to avoid cut to mother/ /baby or the health care worker.
- Take universal precautions for conducting delivery
- Use Plastic apron/ mask/ sterilized gown/ gloves/ goggles/ closed footwear's for all deliveries.
- Avoid repeated pervaginal examination to avoid infection.
- Avoid catheterization unless indicated
- Drape perennial area with sterile linen while delivering a women or suturing episiotomy and perineal tears.

- Put soiled linen, gloves and instruments in 10% hypochlorite solution for half an hour before sending for washing
- Carbolise delivery table each time after use after the patient has been shifted.
- Placenta should be collected in a separate bucket in a plastic bag and incinerated.
- Floor soiled with blood /amniotic fluid should be cleaned with antiseptic/bleach solution immediately.

4.8 Autopsy Procedures

The autopsy room has always been a potential source for infection long before the concept of bacteria had been developed. Following diseases can be transmitted while performing autopsies or embalming procedure.

1. HIV/HTLV
2. *Mycobacterium tuberculosis* and other species
3. Hepatitis Virus
4. Slow Viruses

General Morgue organisation

1. Have full-time morgue staff and not an unwilling assistant sent for some day from some other section of the hospital.
2. Get the longest and widest table possible and see that it is installed with just sufficient tilt to allow free drainage of a constant flow of water from top to bottom. Stainless steel is the best material, with a raised edge all around to prevent spillage. At the foot have a large deep sink with hot and cold water.
3. A post-mortem room should be well ventilated and much lighted. Illumination should be quite independent of daylight. Have ample overhead fluorescent lamps plus at least one lamp with a flexible metal neck so that it can shine at an angle into the base of the skull and into the thorax and abdomen.
4. Tiles are recommended for the walls, at least to shoulder height. For the floor smooth terrazzo is much better than tile which collects dirt in innumerable cracks between the tiles. The floor should incline towards a drainage point so that it can be easily hosed. Regular repairs of cracks in the floor is needed. Windows should be high.
5. Have separate toilet, shower, changing room and some office space and linen room for morgue attendant. The pathologist requires desk office of his own & hand basin along with antiseptic and first aid supplies.

6. Have numerous sponges and needles boards for cutting and disinfecting the removed organs.
7. Whether the morgue needs its own electric furnace for disposal of organs depends on the individual hospitals.
8. Every morgue should have a corner for color photography.
9. No matter how inadequate facilities are given, the morgue should be kept clean and tidy, with instruments neatly put away.
10. *AIDS autopsy should be carried out with special care*, additional protective clothing and choice of more senior diener. Even though it is always talked that universal precautions should be taken for all autopsies, it is almost impossible to achieve this due to budgetary restrictions.
11. Preparation of AIDS autopsies pre requisite sodium hypochlorite solution, pajama, shirt, gown, cap, mask, double latex gloves, shoes with plastic shoe cover, plastic, apron, protective goggles or face shield.
12. During procedure tips of the fingers are particularly prone to needle or blade injury. Needles and blades must be handled carefully. Be careful while loading the scalpel and removing the blade. Never put one hand under the tissue/organ that you are cutting with the other hand.
13. Removal of sternum should be done carefully, preferably with the help of a bone cutter. Ribs should be cut through cartilaginous portion; this prevents injury to hand by the tips of already cut ribs.
14. After postmortem procedure, the cadaver should be stitched properly so that no fluid can come out and cadaver is washed with tap water and then with 2:1 Sodium hypochlorite solution. Nose and mouth should be plugged with cotton swab soaked with appropriate dilution.
15. Cadaver is then put in a plastic bag for handing over to the relatives to avoid dissemination of HIV/AIDS. There should be a hospital policy to provide plastic bags to all cadavers.
16. The tables and floors should be carefully wiped out with a 2:1 hypochlorite to remove the blood stain and body fluids & soap and water.
17. The instruments used for autopsy should be wiped out with sodium hypochlorite solution. Aluminium and stainless steel instruments are damaged by sodium hypochlorite and instruments made of those material should be decontaminated with a 2% aqueous gluteraldehyde solution. After 4 hours, the instruments are washed and autoclaved and are reusable.
18. Adequate washing facilities must be available in the vicinity of the autopsy room. After autopsy, pathologist and other staff must wash their hands thoroughly with soap and water. Plastic apron, plastic shoe cover, gloves, plastic cap and mask must be discarded in plastic bag. Tie the bag properly and send it for incineration. The pyjama, shirt, cotton, gown should be soaked in sodium hypochlorite solution & washed

with water & then sent for autoclaving.

19. Tuberculosis is more common among pathologist. They are infected mostly from clinically unsuspected cases having disseminated tuberculosis. Studies have shown that cutting of infected lung with a knife can generate small particle aerosols.

Injury to skin during autopsy procedure can lead to cutaneous tuberculosis. (hence careful procedure is recommended).

AIDS cases with disseminated tuberculosis and having numerous tubercule bacilli is more likely to pose risk of acquisition of TB at autopsy.

20. Tuberculosis negative autopsy staff should be immunised with BCG before employment.

Medical supervision of autopsy staff should be performed regularly.

21. Vaccination of autopsy staff with Hepatitis B is mendatory.

4.9 DENTISTRY

The knowledge in HIV infection has become critically important for professionals who are responsible for oral health care delivery since HIV infected individuals actively seek consultation and care for oral health. Many a times oral complaints and findings are the first signs and/or symptoms of HIV infection.

Dentists at large are therefore exposed to various microorganisms transmitted by inoculation and inhalation. Cross-infection control is a basic requirement of an ethical and professional practice of medicine. It encompasses measures not only against the dreaded HIV but also against any other infectious disease such as tuberculosis and hepatitis B. Uniform high standards of disinfection control measures must be practised for all patients. However, additional precautions may be practised while treating patients in the high risk group for any infectious disease and not only HIV seropositive patients. Wherever possible disposable instruments should be used, particularly the so called critical instruments e.g. blades, injection, needles etc.

PROTOCOL FOR GLOVES – STANDARDS & UTILITY

1. Ideally gloves must be disposable.
2. In high risk patients, double gloves must be used and disposed suitably after use
3. Routinely single gloves are sufficient
4. Change gloves after 1 hour, continuous wear may be detrimental.

5. Total time a glove can be used is 3 hours.
6. Between patients disinfect gloved hands with a suitable disinfectant e.g. 1% NaOCl, Betadine (1% available Iodine) or at least soap for minimum 30 seconds.
7. Do not touch areas not directly involved in the diagnostic or treatment procedures having started the procedure.
8. Wash hands thoroughly with soap before wearing gloves and after degloving.
9. Check gloves for gross defects every time you wear it. Cover cuts or wounds in the hand with waterproof bandaid before gloving.
10. Discard gloves at the least suspicion of puncture.

MASKS

1. Masks are mandatory as patient's breathes may contain infected aerosols.
2. Masks should be disposable.
3. Masks should be of good fitting.
4. Masks should be changed after any surgical procedure (lasting more than 20 minutes) or any procedure where an aerosol sprays is expected (e.g. Use of hand piece) or in a high risk patient (e.g. known HIV/ kochs patient).
5. The masks should be disinfected with liquid bleach before washing.
6. This will entail that staff/student has minimum 8-10 cloth masks in the event disposable masks are not economically feasible.

PROTECTIVE EYEWEAR

Protective eyewear is recommended for all dental procedures especially for procedures where aerosol is produced.

APPROVED DISINFECTANTS

Povidone iodine, an intermediate level disinfectant can be used as a (1% available iodine) surface disinfectant for instrument tray, head rest, hand piece etc.

Sodium hypochlorite 1% is a low-level disinfectant, where-as 5% acts as strong disinfectant even in the presence of debris. However users are cautioned that it can cause rusting of many instruments and has an offensive residual odour.

2% glutaraldehyde: Only glutaraldehyde can be reused. Hence it is preferable. However its strong odour precludes its use as a surface disinfectant. When used for sharp instruments 2% glutaraldehyde provides high level disinfection which approximates sterilization.

The right choice of disinfectants can be made depending on the need of the clinician and the objects must be soaked/ wetted/ immersed (as is possible) in the disinfectant.

GENERAL PRINCIPLES

1. All instruments should be autoclaved. If this is not possible they should be disinfected in boiling water for 20 minutes and then air cooled before use.
2. All instruments should be presoaked in a disinfectant (preferably 2% glutaraldehyde for 10 minutes before cleaning and autoclaving)
3. A toothbrush may be used for cleaning the instruments.
4. Workers should be asked to wear utility gloves while cleaning instruments.
5. Intraoral X-ray film packets should be disinfected with 2% glutaraldehyde for 10 minutes before processing.
6. Disposable cover should be used biteblock for the OPG machine. Failing this the biteblock must be constantly immersed in a suitable disinfectant such as 2% glutaraldehyde except when in use.

PROSTHETIC AND RESTORATIVE DENTISTRY

Prosthodontic and orthodontic impressions should be routinely disinfected. Alginate impressions should be kept in wet cotton soaked in sodium hypochlorite, for 10 minutes. Zinc oxide eugenol impressions should be disinfected with 2% glutaraldehyde solution for 10 minutes.

- *Burs, reamers, files* used for root canal treatment (RCT) of cavities should be cleared of debris and disposed after single use or autoclaved or immersed in 2% glutaraldehyde permanently. It is

also suggested that there be a holding solution into which burs and endodontic instruments can be dropped after the use in any patient. The burs and endodontic instruments should not be reused on another patient in the same session. Handpeices ideally should be autoclaved. If this is not possible it should be wiped and wrapped in Povidone iodine solution for 10 minutes after running the air rotor with the water channel for 20 seconds between any two patients.

- Use of suction while using air rotor procedures or ultrasonic scalers.
- Operation theatre should be suitably fumigated with ethylene dioxide or potassium permanganate. Soiled dressings (Saliva/Blood), tissues and teeth to be incinerated.
- Blood collecting pipettes and their disposable tips should be present in sufficient number. Disposable lancets or syringes and needles should be used.
- Sucking bulbs should be used for blood collection instead of mouth sucking.
- Microslides used in the department should be disposed off or disinfected with hypochlorite, cleaned with water and oven cooked.

GENERAL RECOMMENDATIONS

1. It was suggested that an additional set of instruments are made available that one set is being disinfected while the other set is being used.
2. Practice of four handed dentistry is recommended
3. Gloves, mask and apron should not be worn beyond the clinic premises.
4. Gloves and aprons must be changed after every patient or every surgery. Atleast they should be changed after every session or at least every day (Need about 5 aprons/person).
5. Students using extracted teeth for technical work should decontaminate the teeth in glutaraldehyde for 5 hours.
6. Hair should be neatly tied/combed or head gown worn.
7. The sterilisation zone should be distinctly separate from the clinical area.
8. Using more appointment based treatment with longer appointment, time for each patient can reduce the tedium of disinfection and sterilisation. (This may be difficult in our institution, but can be done for high risks patients or high risk procedures.)
9. Dental hygienists and assistants form an important link for effective infection control. They have to be educated. They should also be vaccinated for Hepatitis B.

4.9 ENDOSCOPIC EXAMINATION

Endoscopes are flexible piped equipment which consist of fibreoptic devices and further connected to audiovisual devices. These equipment are used in following conditions:

1. Upper gastrointestinal endoscopes
2. Upper gastrointestinal endoscopes (colonoscopes etc.)
3. Bronchoscopes
1. Urethrosopes/cystoscopes
2. Pharyngoscopes
3. Oscopes
4. Laparoscopes
5. Colposcopes
6. Arthroscopes
7. Endoscopes for other cavities

These equipments can get contaminated with blood or mucosal secretion, the nature of contamination in later case will depend upon the cavity it was used in.

Most of these cavities are colonised/infected with commonsals/pathogens such as rectum, intestines, oral cavity, lungs, vagina etc.

If these equipments are not properly disinfected after every use several infectious organisms can cross-contaminate/infect the other patients. Commonly reported diseases transmitted through these equipments are HIV, HBV, HCV, HAV, HEV, *Mycobacterium tuberculosis*, *E.coli*, *Salmonella* and other enterobacteria, *Staphylococcus*, *Pseudomonas*, *Diphtheroids*, *Bordetella pertussis*, *Helicobacter pylori*, *Neisseria*, *Haemophilus influenza*, fungi like *Candida*, *Trichosporon*, and parasites such as *Amoeba*, *Giardia*, *Enterobius*, *Strongyloides* etc.

These equipment are best decontaminated with 2% gluteraldehyde for 30 minutes followed by 3-4 rinsing with sterile water.



Figure 25
Endoscopes and other equipment must be disinfected with 2% glutaraldehyde (Cidex) before re-use.

DISINFECTION AND STERILISATION

Disinfection and sterilization are necessary to prevent cross-infection from skin, equipment and surfaces used in all hospitals. Disinfection is used to reduce the number of microorganism on an object or surface, although the disinfectant used rarely destroy all the micro-organism or spores they came into contact with. Decontamination renders an article safe for handling. Sterilisation (absolute term) is used to remove all living microorganisms, including spores, from an object by any of the two methods:

Heat Sterilisation - This is the cheapest, safest and most effective method of sterilisation. It could be by dry heat such as flame or by wet heat such as autoclaving or boiling.



Sterilise with Steam for at least 20 minutes under pressure (101 kpa 15 lbs/sq. inch) at 121°C (250°F) in an autoclave, pressure cooker or steam steriliser.

Sterilise with dry heat for 2 hours at 170°C (340°F) in an electric oven.
(The method of choice for glasswares, sharp instruments etc.)



Make sure that the instruments are completely dipped in rolling boiling water.

**BOIL IN WATER
FOR 20 MINUTES**

SOAK IN ANY ONE OF THE FOLLOWINGS FOR 30 MINUTES.

10% Hypochlorite solution, 2% Gluteraldehyde (Cidex), 70% Ethyl alcohol, 70% Surgical spirit, 2.5% Polyvidone iodine, 4% Formaldehyde, 6% Hydrogen peroxide.

Figure 26

Chemical disinfection - the only reliable chemical disinfection method is prolonged exposure to 2% alkaline glutaraldehyde (CIDEX), although this can become inactivated under adverse conditions. This method should only be used on heat sensitive items of equipments (e.g. endoscopes) and must be used with caution, though its efficiency and safety for instruments has been well tested.

Rules for the use of disinfectants:

- Follow the manufacturer's instruction:
- Check the expiry date of the solution.
- Ensure that the optimum dilution is used.
- Always wash and clean articles before disinfection.
- Do not refill disinfectant containers without sterilizing the container between each use - topping up is **NOT** allowed.
- Disinfectants ideally should be supplied ready for use from the pharmacy.
- Empty containers should be returned to the pharmacy. New stocks should be supplied on receipt of empty containers. Do not discard empty containers or use them to store any other solutions - this is dangerous and must be discouraged. Chemicals can be harmful when used in the wrong situation.
- Disinfectant should not be used to sterilize instruments or equipments (unless specified in the disinfect policy, e.g. endoscopes).
- Open containers of disinfectant should not be tolerated in any hospital environment as there is a serious risk of contamination with multiple antibiotic-resistant bacteria such as *Pseudomonas* species and spores.
- Where disinfectants are indicated for use on surfaces, they should be used for wiping - **do not take bathe in the disinfectant**. Bathing dilutes the disinfectant.



Figure 27

The all glass syringes and containers and steam impermeable semisolid substances like wax, paraffin etc must be disinfected and sterilized in ovens. Other items should be sterilized by autoclaving.

Cleaning and disinfection of various items commonly used in the hospital

General use articles

- ✓ Bath water - Add Savlon when necessary.

- ✓ Bed pans
 - Wash with hot water and keep dry.
 - Disinfect with phenol after used by infected patients.
- ✓ Bowls
 - Autoclave/wash with hot water and keep dry.
- ✓ Crockery, Cutlery
 - Wash with hot water and detergent. Keep dry.
- ✓ Floors
 - Vacuum clean.
 - **No Broom to be used**
- ✓ Furniture, Bed Frames-
 - Damp dust with detergent or with phenol or with 2% lysol solution.
- ✓ Mattresses/Pillows
 - Cover with water-impermeable cover. Wash cover with detergent solution and dry. Disinfect with phenol when necessary.
- ✓ Trolley tops
 - Wipe with warm water and detergent to remove dust and keep dry.
- ✓ Thermometers
 - Wash with warm water and detergent or 70% alcohol for one minute and keep dry.
- ✓ Endoscopes/Arthroscopes/Laparoscopes/Fiberoptic Endoscopes
 - Immerse in 2% alkaline glutaraldehyde (CIDEX) under strict controlled conditions, as per manufactures instructions.
 - Permissible exposure level is 0.2 ppm with 0.82 mg./cm³ at 25°C for 8 hours for aldehyde.
 - Use latex gloves, eye protection plastic covering mask while handling.
 - Environment should be checked for aldehyde every 14 months by gas chromatography or high performance liquid chromatography or methylene blue tetrazolium hydrochloride or by colorimetric method.

Alternatively, use –

- Ethylene oxide sterilization
- Alcohol disinfection
- Hydrogenperoxide and peracetic acid

- ✓ Endotracheal suction catheter
 - Should be disposable.
 - Or may be stored for 24 hours properly so that it does not get contaminated.
 - Flush catheter with sterile distilled water after each use.
 - Bowl must be washed and dried after each suction.

- ✓ Endotracheal tubes
 - Recycled after cleaning and autoclaving.
- ✓ Ambu Bags.
 - Ideally heat disinfect.
 - Or immerse in 2% glutaraldehyde and then wash with sterile distilled water to reduce the risk of chemical irritation which can precipitate respiratory infection.
- ✓ Oxygene delivery face mask
 - Wash and then dry.
 - Wipe with 70% isopropyl alcohol to remove mucus.
- ✓ Suction drainage bottles
 - Ideally autoclave.
- ✓ Ventilatory circuits, respiratory equipment in neonatal/Paediatric unit.
 - Heat disinfection at 80° C for 3 minutes.
 - Or autoclave
 - Or Ethylene oxide sterilization.

Do not use these instruments for more than 72 hours without sterilisation.

If filters are installed on the expiratory and inspiratory ends of ventilation, the same circuit can be used for 4-5 days before sterilization becomes necessary.

- ✓ Incubators
 - Clean thoroughly with warm water and soap.
 - Wipe with 70% Isopropyl alcohol.
- ✓ Humidifiers
 - Empty daily.
 - Refill with sterile water.
 - Disinfect when contaminated, with 1% hypochlorite for 30 minutes, wash and dry.
 - Autoclave after each patient's use.
 - Autoclave when respiratory circuit is changed.
- ✓ Urinary catheter
 - Ideally single use - disposable.

Sterilisation

Proper sterilisation ensures protection against HIV, HBV and HCV. This forms an essential part of good medicine. Instruments should be soaked in disinfectant for 30 minutes, cleaned and then sent for sterilisation.

Sterilisation by steam (Autoclave)

- Temperature: 121 °C/250 °F
- Pressure: 1 atmospheric pressure (101 kPa 151 pounds per square inch)
- Time: 20 minutes

Recently a new equipment has been introduced for sterilization. The equipment is called Hydroclave. The principle of hydroclave is that the materials are not sterilized by steam but after sterilization the solids are dehydrated and shredded to 20% of the original volume.

This equipment is installed only at Tata Memorial Hospital, Bombay.

Sterilization Methods

	Dry heat	Autoclave	Ethylene oxide	2% glutaraldehyde	Formaline	Gamma radiation
Duration						
Gloves	-	✓	-	-	-	✓
Plastic Syringe	-	-	✓	-	-	-
Glass Syringe	-	✓	-	-	-	-
Needles	-	✓	-	-	-	✓
Endoscopic Instruments	-	-	-	✓	✓	-
Suction tubes	✓	-	-	✓	-	-
Suction bottles	-	✓	✓	✓	✓	✓
Cautery cable	-	-	✓	✓	✓	✓
Cautery points	-	-	-	✓	✓	✓
Laryngoscopes	-	-	-	✓	✓	✓
Endotracheal Tubes	-	-	✓	✓	✓	✓
Catheters	-	-	✓	✓	-	✓
Cath. Lab. Matn.	-	-	✓	✓	-	✓
Blanket	✓	-	-	-	-	✓
Mattresses	✓	-	-	-	-	✓
Suturing needle	✓	-	-	-	-	✓
blades/scissors						

Method of choice of sterilisation for re-usable instruments

Sterilisation by dry heat (Electric Oven)

- Temperature: 170 °C/ 340 °F
- Time: 2 hours
For those instruments only that can withstand high heat

Sterilisation by moist heat

- For high-level disinfection
- Boiling for 20 minutes
 - Autoclaving

Chemical Disinfectants

- Sodium Hypochlorite (0.5%)- most commonly used disinfectant

Advantages

- Bactericidal
- Virucidal
- Inexpensive
- Easily available

Disadvantages

- Corrodes metal
- Deteriorates rapidly

- Ethanol/ Propanol/ Alcohol/ Spirit (70%)
- Povidone Iodine (2.5%)
- Formaldehyde / Formalin (4%)
- Chloramine (2%)
- Glutaraldehyde (2%)
- Hydrogen Peroxide (6%)

Wiping with chemicals (for surfaces and spills)

- Sodium hypochlorite solution (0.5 - 1.0%)
- Alcohol/ Spirit

Following disinfectants should be made available in all health care settings-

DISINFECTANTS

✓ Bleach 1% Solution

(Distributed throughout the Hospital in plastic recyclable bottles for Disinfection of Materials Contaminated with Blood and Body Fluids).

✓ Bleaching Powder

(For Toilets Bathrooms etc.)

✓ Methylated Spirit (70%)

(For Disinfecting Surfaces on which Bleach Can not be Used e.g. Smooth Metal Surfaces, Table Tops etc.)

✓ Alcoholic Handwash:

(70% Methyl Alcohol To Which 1% Glycerin Is Added, Available In All Clinical Settings)

✓ Glutaraldehyde 2%:

(Disinfection of Surfaces and Instrument that are destroyed by bleach)

✓ Detergent With Enzyme

(For Cleaning Endoscopes, Theatre Instruments and Obstetric Instruments Before Disinfection).

✓ Savlon 1%

(For Cheatle Forceps- Solution to be changed Daily)

OPERATIONAL GUIDE LINES ON HOSPITAL WASTE MANAGEMENT

Introduction

Hospital wastes have always been considered as potentially hazardous in view of the inherent potential for dissemination of infection. In recent years, wider variety of potentially hazardous ingredients including antibiotics, cytotoxic drugs, corrosive chemicals and radioactive substances have become a part of the hospital waste.

The major identified hazard was that of infection, because over millennia communicable diseases had been the most common cause of morbidity and mortality in the community and majority of persons receiving treatment in the hospitals were suffering from communicable diseases. Disinfecting right at source and disposal by incineration, which completely destroys micro-organisms of all types, has been the time tested and most widely advocated method for safe management of hospital waste. The advent of antibiotics led to complacency regarding infection control and safe disposal of hospital waste. The rising trends of HBV and HIV infection in the community and among health care providers has led to an increasing awareness about the risk associated with this lackadaisical practice and the need to evolve and implement strategies for safe and sustainable methods of disposal of waste material generated at different sites in health care delivery system.

Nature and Quantum of Hospital Waste

Three major categories of health care facilities exist in India:

(i) OUTPATIENT CLINICS OR DISPENSARIES:

This category constitutes the largest number of clinics or dispensaries in the private sector; subcentres manned by the Female Health workers and primary health care centres (PHCs) in the rural areas and dispensaries, mobile dispensaries, health and family welfare posts provide outpatient care in Government sector.

(ii) OUT PATIENT AND INPATIENT CARE HOSPITALS:

The network of Community Health Centres with 30 or more beds is the most important peripheral health facility that provides inpatients care in rural areas in public sector. Small nursing homes in private sector also provide inpatient as well as out patient care in peripheral rural areas.

(iii) The next tier of hospitals range from sub-divisional and district hospitals, medical college hospitals to

speciality hospitals in public sector. Similar hospitals in private sector provide both in patient and out patient care.

In this vast network of health infrastructure in the Government sector and private sector, catering to the health care needs of the population. The large hospitals are relatively small in number while the small out patient care providing centres outnumber all other facilities. All these facilities generate waste, which require safe disposal.

HOSPITAL WASTES MANAGEMENT

By hospital wastes, it means specially the bio-medical wastes generated in different departments of the hospitals. It is estimated that in most of the health care settings, about 85% of the waste generated is non-hazardous, about 10% is infectious wastes and 5% non-infectious but hazardous waste.

Medical wastes:

The term medical waste is used to describe any waste, which is generated in the diagnosis, treatment, or immunisation of human beings or animals, in research pertaining there to, or in the production or testing of biologicals.

Clinical wastes:

It is defined as any waste coming out of medical care provided in hospitals or other medical care establishments. This definition does not include medical waste resulting from medical care in the home.

Pathological wastes:

This category includes human tissues, organs, body parts removed during surgery or autopsy or other medical procedures, and specimens of body fluids and their containers.

Infectious wastes:

Includes all kind of wastes, which may transmit viral, bacterial or parasitic diseases. In addition to infectious medical wastes, it includes infectious animal wastes from laboratories, and veterinary practices.

CLASSIFICATION OF HOSPITAL WASTES:

Hospital wastes may be categorised into:

Non-hazardous waste:

It is essential to realise that "non hazardous waste" consisting mainly of kitchen waste products, general office waste comprising of wrapping paper, office paper, cartons, packaging material including plastic sheets, news paper and bouquets etc.

Kitchen wastes include left over food, swill, peels and dirty water (which is drained) generated from the hospital kitchen. We can divide the kitchen wastes into two categories:

- (i) **Biodegradable Kitchen Waste:** which includes peels of fruits and vegetable skin and left over food, tea, drugs and other natural kitchen wastes.
- (ii) **Non biodegradable waste:** This category of kitchen waste includes wrappings, foils, plastic bags and other material, which is essentially man- made.

Hazardous Wastes:

There are two broad categories of hazardous wastes – potentially infectious wastes and potentially toxic wastes.



Figure 28

**TO PREVENT HOSPITAL ACQUIRED INFECTIONS DISPOSE
HOSPITAL WASTE MATERIAL PROPERLY IN DESIGNATED
DUSTBINS**

(i) Potentially Infectious waste from patient care includes:

- (a) Dressings and swabs contaminated with blood, pus and body fluids.
- (b) Laboratory wastes including laboratory samples, cultures stocks of infectious agents, laboratory glassware.
- (c) Instruments used in patient care: these range from diagnostic equipment such as endoscopes, ultrasound probes, syringes and needles, sharps and other instruments.
- (d) Potentially infected materials: Placenta, tissues, tumors, organs or limbs, which are removed during surgery.
- (e) Potentially infected animals: used in diagnostic or research studies.

In all these wastes the major concern is to prevent potential accidental transmission of infection.

(ii) Potentially toxic wastes includes:

- (a) *Radioactive waste*: These may be solids, liquids and gases used for analytical procedures, body organ imaging and tumor localisation and treatment. Both use and disposal of radioactive wastes should be carried out with great care. In India, the responsibility for ensuring safety with respect to use and disposal of radioactive materials is with the Bhabha Atomic Research Centre.
- (b) *Chemical Waste*: These may be hazardous toxic, corrosive, inflammable, reactive or genotoxic. They require safe disposal, which will ensure that human or environmental problems do not arise during storage, transport and final disposal.
- (c) *Pharmaceutical Waste*: This may enter hospital waste because surplus stock, spillage or contamination is detected or expiry date is over. Apart from the usual care needed for safe disposal of these chemicals, special attention has to be paid to ensure that they do not get recycled and are disposed off in a manner that there is no ecologically undesirable side effects.

QUANTUM OF WASTE

The quantum of waste generated will vary depending upon the type of health problem, the type of care provided and the hospital waste management practices. There are no reliable figures available on the quantum of waste generated per person/day either in out patient or in patient care in Indian hospitals. Available data from developed countries indicates that even in these countries there is a wide range of waste generated: 1 to 5 Kgs of solid per head per day. Also there are substantial inter-country and inter-speciality differences in the quantum of waste generated. Available meager data on quantum of waste generated in some developing countries indicates that the range is essentially similar. It is estimated in developing countries that in most patients may generate between 1-2 Kgs. of waste. Waste generated in developing countries contain much less disposable articles and plastics than waste generated in developed countries, the differences are partly due to differences in use of disposables in health care and partly due to life styles of the population.

Health hazards associated with poor hospital waste management

Although there are no reliable epidemiological data from developing countries on the health impacts of poor hospital waste management, the problems identified are:

- (a) Injuries from sharps to all categories of hospital personnel;
- (b) Nosocomial infection in patient from poor infection control and poor hospital waste management;
- (c) Risks of infections outside hospitals for waste handlers, scavengers and (eventually) the general public;
- (d) Risks associated with hazardous chemicals, drugs being handled by persons handling wastes at all levels, and
- (e) "Disposable" – recycled – repacked and sold without being even washed.

Infections remain to be the most common health hazard associated with poor hospital waste management. The advent of HBV and HIV have made it imperative that hospital waste disposal systems are improved. The major focus is on the potentially infected wastes. There is very little epidemiological data on this aspect from Indian health care settings. However, the rising HBsAg prevalence among medical and paramedical persona; working not only in "high-risk areas" such as dialysis unit, trauma centre, casualty and obstetric departments but also among those working in general "low risk areas" is a warning signal that needs to be heeded.

The problem that major hospitals faced when AIDS cases were first admitted clearly indicates what even in these premier institutions infection control and waste management systems were sub-optimal and both the staff and the patients were worried about potential accidental transmission of infection. HIV has extremely limited viability outside a living host, although live virus survival time may depend upon the environment and virus concentration. Therefore, except those persons within health care settings, the potential to develop HIV infection from medical waste contact is relatively remote. Because HBV remains viable for an extended time in the environment, the potential for HBV infection following contact with medical waste is likely to be higher than that associated with HIV.

Route of transmission of Infection from potentially infectious wastes

There are four possible routes of transmission of infection from potentially infected waste. These are:

- (i) Through non-intact skin (pre-existing cuts, raw areas) or by cuts and puncture of the intact skin.
- (ii) Through mucous membranes such as splashing into eyes.
- (iii) Inhalation of dust particles containing germs.
- (iv) By ingestion through contaminated unwashed hands, contaminated water or foodstuffs.

Categories of Persons exposed to risk of Infection

The category of persons exposed to potential risk of infection, from the wastes, which are not properly disposed, include:

- (a) Other patients attending the health care facilities.
- (b) Medical and paramedical person providing health care.
- (c) Persons involved in collecting and disposing the waste material.
- (d) Those involved in clearing the instruments, floor, surfaces and washing of glassware and linen.
- (e) If potential waste gets mixed with solid waste from other activities, the entire chain of workers/persons involved in solid waste disposal.

- (f) If some of the disposable items are introduced in the market as sterile without being sterilised, the patients who receive treatment are at risk.

HOSPITAL WASTE MANAGEMENT

General hospital hygiene is a pre-requisite for good medical waste management. It will be useless in terms of prevention of nosocomial infections to start improving hospital waste management if the hospital does not have a reliable supply of safe water and basic sanitation facilities accessible to hospital personnel, patients and visitors. Most hospitals in India lack these basic amenities. It is vital that the whole hospital be kept clean and in a satisfactory state of hygiene to prevent spread of infection from patient to patient, patient to health care providers and health care providers to patients. In terms of prevention of spread of infection outside the hospital, careful management of wastes from the point of generation to safe disposal is of paramount importance.

PRINCIPLES OF INFECTION CONTROL

The infections acquired in health care setting can be greatly minimised by observing some simple precautions. The broad principles of infection control includes the following:

Infection Control Measures

Each institution should establish an appropriate infection control policy (ICP) and programme. A mechanism should be set up for planning, implementing and monitoring the evaluations of ICP and programmes. Prevention measures are essential and are very cost effective, but are often overlooked and considered unnecessary for health care workers.

Hand washing is the most simple and cost effective measure and must be encouraged. Disinfectants should be prepared and used according to the guidelines.

Patients admission

A patient should not be admitted into a hospital unless it is absolutely necessary and he/she should be discharged as early as possible to reduce the risk of infection.

Hygienic environment

Health care facilities should be kept clean and void of virulent organisms by proper house keeping. Cleaning of premises and room floors with water and detergent is recommended. Cleaning with a disinfectant is usually not necessary unless there is spillage with potential infectious material. Architectural design of a health care facility should permit good ventilation. Proper waste disposal, water treatment, disinfection and sterilisation of equipment can reduce the risk of infection among patients, health care workers and community. To minimise the spread of infection, it is important that hospitals/health centres and the surroundings remain clean and no waste is spilled anywhere outside or inside the hospital premises. A clean hospital has positive effects on its patients and its personnel too.

Monitoring of Infectious agents

Microorganisms responsible for infections in health care settings may originate from patients. The environment or health care workers, their sources of infections are to be identified and specific measures must be taken appropriately to prevent their spread.

Waste reduction and reuse

There is a growing trend in health care settings to provide or use disposable materials in all aspects of work. Some are quite necessary for proper infection control and worker and patient safety. Hospitals should select a mixture of disposable and reusable material depending upon their situation, e.g. General Wards and OPD can use mostly reusable items but casualty departments may incorporate more of the disposable items. More wastes means more expense on waste disposal. Reuse not only reduces disposal cost but also reduces procurement cost for medical items. Some of the things a hospital can do to reduce waste it produces are to procure products that have longer life cycle and also choose products with less packaging. The idea behind proper procurement is: (i) find alternative to single use items where possible; (ii) find alternative materials, which are more environmentally benign at all stages and even during disposal; and (iii) find medical kits that do not have much packaging.

STEPS IN WASTE MANAGEMENT

Waste survey

Waste survey is an important component of the waste management scheme. A survey helps in evaluating both the type and quantity of waste generated in the hospital. A survey aims to:

- (i) Differentiate the types of waste;
- (ii) Quantify the waste generated;
- (iii) Determine the points of generation and the type of waste generated at each point;
- (iv) Determine the level of generation and disinfection within the hospital;
- (v) To find out the type of disposal carried out; and (vi) get familiar with the personnel at all levels.

With this information, it will be easy to:



Figure 29
Hospital waste must be disinfected before its disposal.

- (i) Provide specific receptacles for different wastes at different levels of output (depending upon the services/work).
- (ii) Determine the type of disinfection needed and the point at which it should be carried out in the waste stream.
- (iii) Use the information in hospital specific training.

The Ministry of Environment and Forests has a classification, which is notified in the Bio-medical Handling and Management Rules. These have been appended below

Categories of Bio-medical Wastes

Category	Type of Waste	Treatment & Disposal Option
Category 1	Human Anatomical Wastes (Human tissues, organs, body parts)	Incineration/deep burial
Category 2	Animal wastes (Animal tissues, organs, body parts, carcasses, bleeding part, fluid, blood and experimental animals used in research waste generated by veterinary hospitals)	Incineration/deep burial
Category 3	Microbiology and Bio-technology wastes (wastes from laboratory cultures, stocks or specimens of micro-organisms, live or attenuated vaccines, human and animal cell culture used in research and industrial laboratories, wastes from biological productions, toxins, dishes and devices used to transfer cultures)	Local/Autoclaving/Micro-waving/ Incineration
Category 4	Waste Sharps (Needles, syringes, scalpels, blades, glass etc. that are capable of causing puncture and cuts. This includes both used and unused sharps)	Disinfection (Chemical)/ Autoclaving/ Microwaving and mutilation/ Shredding

Category	Type of Waste	Treatment & Disposal Option
Category 5	Discarded Medicines and Cytotoxic Drugs (Waste comprising of outdated, contaminated and discarded drugs and medicines)	Incineration / Destruction and disposal in land fills
Category 6	Soiled Wastes (Items contaminated with blood and body fluids including cotton, dressings, soiled plaster, linens, bedding, other materials contaminated with blood)	Incineration/Autoclaving/ Micro-waving
Category 7	Solid Wastes (Wastes generated from disposable items other than the waste sharps such as tubing, catheters, IV sets, etc.)	Disinfection by chemical treatment/Autoclaving/ Microwaving and Mutilation/ Shredding
Category 8	Incineration ash (Ash from incineration of any Bio-medical wastes)	Disposal in municipal land fills
Category 9	Chemical Wastes (Chemicals used in biological production, chemicals used in disinfection such as insecticides, etc.)	Chemical treatment and discharge into drains for liquid and secured land fills for solids.

SEGREGATION AND SAFE STORAGE

Segregation at source and safe storage is the key to whole hospital waste management process because it is at this stage that wastes are segregated into different streams. Incorrect classification of wastes can lead to many problems at a later stage. Segregation should be carried out at the point of generation, to keep general waste from becoming infectious. If the infectious waste, which forms a small part of hospital wastes, is mixed with the other hospital wastes, the entire waste will have to be treated as infectious waste. To treat entire waste as infectious is an expensive option and is also dangerous practice specially if the waste is being dumped without any prior treatment.

Thus, by segregation, a hospital can: (i) reduce total treatment cost; (ii) reduce the impacts of this waste on the community; and (iii) reduce the chances of infecting health care workers.



Figure 30

All hospital-generated waste must be disposed off appropriately. While handling and transporting it all hospital personnel must use personal protections and the waste must not be transported in open trolleys.

It is essential that all sharps (whether infected or not), infected wastes not containing sharps, chemicals and pharmaceuticals other than cytotoxic drugs, other hazardous wastes are segregated by medical and paramedical personnel users and are kept separately in readily identifiable, preferably colour coded containers. Radioactive wastes, cytotoxic drugs and high pressure containers require a special handling and disposal channels. Ministry of Forest and Environment has notified the types of containers and their colour codes for storage of different categories of hospital wastes as appended in table below:

Colour Coding and Containers for Disposal of Bio-medical Wastes

Colour Code	Type of Container	Waste Category	Treatment Options
Yellow	Plastic bags	Human & animal wastes, Microbial and Bio-technological wastes, and soiled wastes (Category 1,2,3 and 6)	Incineration/deep burial
Red	Disinfected container/ Plastic bag	Microbiological and Bio-technological wastes, soiled wastes, solid waste (Category-3,6 and 7)	Autoclaving/Microwaving/ Chemical treatment
Blue/White transparent	Plastic bag/Puncture proof container	Waste sharps and solid waste (Category 4 & 7)	Autoclaving/Microwaving/ Chemical treatment, Destruction and shredding.
Black	Plastic bag	Discarded medicines, Cytotoxic drugs, Incineration Ash and Chemical Wastes Category 5,8 &9 (solids)	Disposal in secured landfills.

CHOICE OF BINS OR RECEPTACLES

Hospital managers may prefer to use plastic or metal bins for waste storage in order to save on the cost and paperwork of buying large number of one-strip sacs. However, since the cost of hospital waste

management is found to be significantly less than 1% of the hospital budget in many cases, the small saving by not providing facilities for waste storage may be regarded insignificant. The extra expenditure involved in buying plastic bags is justified by improved hygiene, hospital infection control and convenience in disposal.

If reusable containers are to be used, considerable thought should be given to methods of cleaning and disinfecting them in an unpleasant task that would tend to be avoided unless there is a high degree of motivation and supervision. The containers should be smooth and well rounded from inside to allow effective and complete cleaning. Any seams or sharp corners would be very difficult to clean. Failure to clean the bins effectively would not only have potentially infectious residue but also lead to unpleasant odors and problems of insects.

The size and number of receptacles should be appropriate to the amount of wastes produced in the hospital sites, assuring that collection takes place twice a day, or more often in operation theatres or intensive care units. The containers should not be too heavy when full so that one man can conveniently handle them. Each receptacle should be clearly labeled to show the ward or room where it is kept.

Handling and Treating

The term treatment refers to process that modify the waste in some ways before it is taken to its final resting place. Treatment is mainly required to disinfect or decontaminate by chemical disinfection of waste right at source, so that this is no longer the source of pathogenic organisms. After such treatment, the residue can be handled safely, transported, stored and disposed. The following should be kept in mind while dealing with infectious wastes:

- (a) Infectious waste must be separated at the points of generation itself.
- (b) Bins with lids lined with polythene bags, or with inner chamber for bucket should be used.
- (c) A lidded bin will discourage inadvertent use by others.
- (d) The bins and bags should also be labeled with the biohazard symbol and if required, for the types of waste they have to be used for.
- (e) Personnel involved in infectious waste handling should be provided with suitable protective wear and should be properly trained.
- (f) Polythene bags placed in the bins have to be changed with each shift or when they are 3/4th full.
- (g) Polythene bags carrying waste have to be sealed/tied at the top whenever the waste is being transported within or outside the hospital.
- (h) Infectious wastes from the wards, ICU, OT, OPD and the labs should have a common specific bin allotted for them at the final point of disposal. This bin should be covered and protected from the public at all times.

- (i) If the hospital does not have a facility to treat the waste (not chemically treated), it has to be sent from its final disposal point to common facility.

Infectious waste needs to be destroyed or disinfected by the recommended methods of disinfection/ destruction of the biologically infectious waste such as autoclaving and microwaving. Incineration is better option for large scale infectious waste management. In this venture private sector should take lead.

Disposal Items

Items like single use products, syringes, IV bottle, catheters, sharps (to be treated separately) and rubber gloves. As such items are often recycled and have the risk of being reused legally, it is imperative that chemical disinfection be followed for them.

Disposables have to be dipped for a minimum duration of $\frac{1}{2}$ -1 hour in the chemical disinfectant or autoclaved or microwaved.

HANDLING OF DISPOSABLE ITEMS

- (a) Disposable items like the gloves, syringes, IV bottles, catheters etc. have to be shredded, cut or mutilated. This ensures that they are not recycled/reused. For instance, the fingers of the gloves should be cut, IV bottles can be punctured and the same can be done for other disposable items.
- (b) Extreme care has to be taken while handling the needles, syringes and blood bags with proper protection. Several cheap forms of needle & syringe cutters are available in these days in India.
- (c) Once the disposable items have been dipped, they have to be dipped in an effective chemical disinfectant for a sufficient time or autoclaved or microwaved so that they are disinfected.
- (d) **CHEMICAL DISINFECTION:**

Chemical disinfection has a wide application in small health care facilities. A good disinfectant is bleach. For chemically treating the waste an optimum concentration of bleach has to be prepared. The concentration prescribed by WHO is 10 gm of bleach in 1 litre water. However, it must be noticed that medical wastes that have been chemically disinfected should continue to be treated as hazardous, unless careful bacteriological testing has shown disinfection to be complete. The bleach solution should be prepared at the beginning of the shift. At the end of the shift or after the bin is full and the waste has been treated with suitable chemical disinfectant, it has to be disposed off. The waste should be collected in plastic bags from all the wards and sections of the hospital to the final disposal site.

Recommended Dilution of Chlorine Releasing Compounds:

Available Chlorine	"Clean" Condition	"Dirty" Condition
Required chlorine	0.1% 1 gm/litre	0.5% 5 gm/litre
Sodium hypochlorite Solution 5% available chlorine	20 ml/litre	100 ml/litre
Calcium hypochlorite 70% available chlorine	1.4 gm/litre	7.0 gm/litre
(NaOCl Powder) Sodium dichlorosocyanurate	1.7 gm/litre	8.5 gm/litre
(NaOCl Tablets) Sodium dichlorosocyanurate	1 tablet/litre	4 tablets/litre
Chloramine (25% available chlorine)	20 gm/litre	20 gm/litre

- Clean condition- after removal of bulk material
- Dirty condition- before removal of bulk material

Sharps

Major portion of the sharps are the needles, which can be cut by a needle cutter and contained in a bleaching powder solution or autoclaved or/and shredded or be destroyed by a needle destroyer. Other than needles, a small amount of sharp waste generated, which may also be contained in a separate bin meant for sharps or in the needle cutter itself depending on the quantity.

Precautions in Handling Sharps

- All the health workers employed in/outside the hospital must be vaccinated against Hepatitis B.
- All the health care workers put on heavy-duty gloves while dealing with infectious wastes specially sharps.
- Sharps should not be left casually on counter tops, food trays or beds as grievous injuries can result.

- (d) Recapping needles should be discouraged. In situation when recapping is unavoidable, the single handed method should be utilised

Liquid Waste

Hospital generates liquid waste, which is either infectious or chemical in nature. To avoid the exposure to the general public, it is necessary that the waste be properly treated. The liquid pathological waste should be treated with a chemical disinfectant. The solution should then be treated with a reagent to neutralise it. This can be flushed into the sewer system.

Radioactive Medical Waste

The use of Nuclear Medicine can be classified into two parts: "Detection and Treatment of disease". In detection (diagnosis), radioactive rays such as radioactive dyes are frequently used. In treatment, isotopes of various elements are used.

Hospitals providing Nuclear Medicine have not only to check for radiation but also to ensure that instruments are properly maintained, proper protective wear is provided, not only to the physicians and other employees of the hospital, but also to the patients.

NON-RADIOACTIVE GENERAL WASTE

- (a) The general office waste comprising of the waste papers can be clubbed with other recyclable materials to be sent for recycling.
- (b) Kitchen waste can be utilised in many different ways – according to the quantity of waste. In large hospitals, technologies like bio digestion can be installed. In smaller establishments, kitchen waste can be composted.
- (c) Non-biodegradable waste can be disposed off in municipal bins:

DISPOSAL OF BIODEGRADABLE WASTE:

The biodegradable waste is comparatively easy to handle. It should be disposed after its biodegradation which can be accomplished by Bio-digestion (using bacteria or earth worms or by Pit composting. After complete decomposition it can be used as biofertilizer.

Chemical Hazardous Waste

Hospital also generates a wide range of chemical hazardous wastes, which may be segregated and properly managed. Chemical hazardous waste may include: solvents, chemotherapy waste, Pathogenic chemicals, Formaldehyde waste, Radioactive waste, Heavy metals like mercury and in instruments, other toxins and corrosives and waste anaesthetic gases. Minimisation of the waste, careful segregation of these wastes and safe disposal of that waste, which can not be recycled is very necessary.

On Site Transportation

Segregated wastes have to be transported within the facility from the point of generation to the final waste disposal site. All bags should be fastened and small trolleys can be used in large facilities. Trolleys and carts should be large enough so that waste is not piled up on them in an unsafe way and they should be stable to minimise the risk of propping over hazardous waste even after decontamination should never be transported with general municipal wastes.

Some of the alternate technologies, which are being promoted in India are:

1. Autoclave

An autoclave is an instrument, which uses steam at high temperature to kill all microbes. There are two types of autoclaves:

- a. *Gravity Displacement Autoclaves:* In this system, the air within the autoclave is pushed out by entering steam.

This process has a problem. There may be air pockets left within the waste, which is being autoclaved. This reduces the temperature of the waste and therefore reduces the efficiency of the system.

- b. *Pre-vacuum Autoclaves:* Once the waste is put into the autoclave, a vacuum is created within the autoclave (all the air from the chamber is removed). Steam, which enters the chamber, is able to penetrate the entire waste. Absence of air pockets ensures that high temperature is achieved within the waste rendering it harmless.

2. Microwave

A microwave system uses high frequency waves. These waves cause the molecules within the waste material to vibrate. This generates heat from within the matter itself. The heat generated is high enough to ensure that all microbes are killed.

3. Chemical Disinfection

Chemical disinfection is cost effective and does not require large investments. In this form of disinfection, a chemical is used to destroy the pathogens. Some of the chemical disinfectants that can be used are:

- a. Sodium Hypochlorite
- b. Bleach

Not all medical wastes should be treated in this way. Only plastic, rubber and metals should be disinfected. It is not advisable to disinfect cloth based medical waste because it is difficult to handle wet waste and it

also adds to the weight and volume of the waste being disposed. Pathological waste, also, cannot be disinfected in this manner unless it is crushed – this procedure may cause aesthetic problems.

4. Incineration

Incineration is the process of burning the solids at very high temperature in a furnace. The temperature in these furnaces is usually high enough to burn even the metals. The furnace is connected to a clin so that the smoke does not pollute the surrounding nvironment.

DISCARDING AND DISPOSAL OF DISPOSABLE MATERIAL

The awareness of the danger of acquiring HIV infection (the causative agent of AIDS) while handling blood and blood contaminated material has resulted in sudden increase in the usage of pre-sterilised disposable material. In most of the hospitals, disposable needles are reused after boiling. This practice must be discontinued immediately.

Thus, there is a definite problem of disposal of the disposable material used for injection and for other skin piercing invasive procedures in the hospitals. In this country, the plastic or the material with which these presterilised disposable equipments are made has got some. Further, there is a high possibility that unscrupulous persons may start re-cycling the disposable material resulting in their reuse without even proper sterilisation.

Thus, it is recommended that the disposable material should be given high priority by ensuring its destruction and eliminating reuse.

Therefore, the following procedure is recommended:

- (a) All the disposable material after use has to be accounted for like any other reusable material. This can be achieved by discarding the disposable material in a plastic/metal container and sealing this in the presence of a responsible person. The plastic container for piercing instruments like needles, etc. should be puncture resistant. Plastic breadboxes are suitable for this purpose. Other non-piercing material can be discarded in plastic bags.
- (b) The incineration area must be out of bounds for everyone except those working there.

MANAGEMENT OF OCCUPATIONAL EXPOSURE & POST EXPOSURE PROPHYLAXIS

1. Introduction:

Assessment of the risk for HIV infection resulting from the exposure and of the infectivity of the exposure source are key determinants of offering post exposure prophylaxis (PEP). Health care workers (HCW) are normally at a very low risk of acquiring HIV infection during management of the infected patient. However, in spite of a low statistical risk of acquisition of HIV, the absence of a vaccine or effective curative treatment makes the health care worker apprehensive. So, it is very necessary to have a comprehensive program in place to deal with anticipated accidental exposure.

Most exposures do not result in infection. The risk of infection varies with the type of exposure and other factors such as,

- ✓ The amount of blood involved in the exposure
- ✓ The amount of virus in patients's blood at time of exposure
- ✓ Whether post exposure prophylaxis(PEP) was taken within the recommended time.

Prevention is the mainstay of strategy to avoid occupational exposure to blood/body fluids. All the biosafety precautions must be practised at all times for all patients' blood and body fluids while providing medical services.

2. Definition of Health care worker and Exposure:

Health care worker (HCW) is defined as any person whose activities involve contact with patients or with blood or other body fluids from patients in a health care or laboratory setting.

An '*exposure*' that may place an HCW at risk of HIV infection is defined as a percutaneous injury (eg – needle-stick or cut with a sharp instrument), contact of mucous membrane or non-intact skin (eg – when the exposed skin is chapped, abraded, or afflicted with dermatitis), or contact with intact skin when the duration of contact is prolonged (eg-several minutes or more) with blood or other body fluids. Body fluids included – semen, vaginal secretions, or other body fluids contaminated with visible blood, cerebrospinal, synovial, pleural, peritoneal, pericardial and amniotic fluids.

3. Steps to be taken on exposure to HIV infected blood/body fluids and contaminated sharps:

1. Immediately following an exposure-

- ✓ Needle-sticks and cuts should be washed with soap and water
- ✓ Splashes to the nose, mouth or skin should be flushed with water
- ✓ Eyes should be irrigated with clean water, saline or sterile irrigants
- ✓ Pricked finger should not be put into mouth reflexly.

Note: Although there is no scientific evidence exists as to the fact that the use of antiseptics for wound care or squeezing the wound will reduce the risk of transmission of HIV, however, this practice is always recommended. The use of a caustic agent such as bleach is not recommended.

2. Reporting of the Exposure:

Report the exposure to the appropriate authority and condition must be treated as an emergency. Prompt reporting is essential because in some cases, HIV postexposure prophylaxis(PEP) may be recommended and it should be started as soon as possible, preferably within a few hours. Initiating treatment after 72 hours of exposure is not recommended.

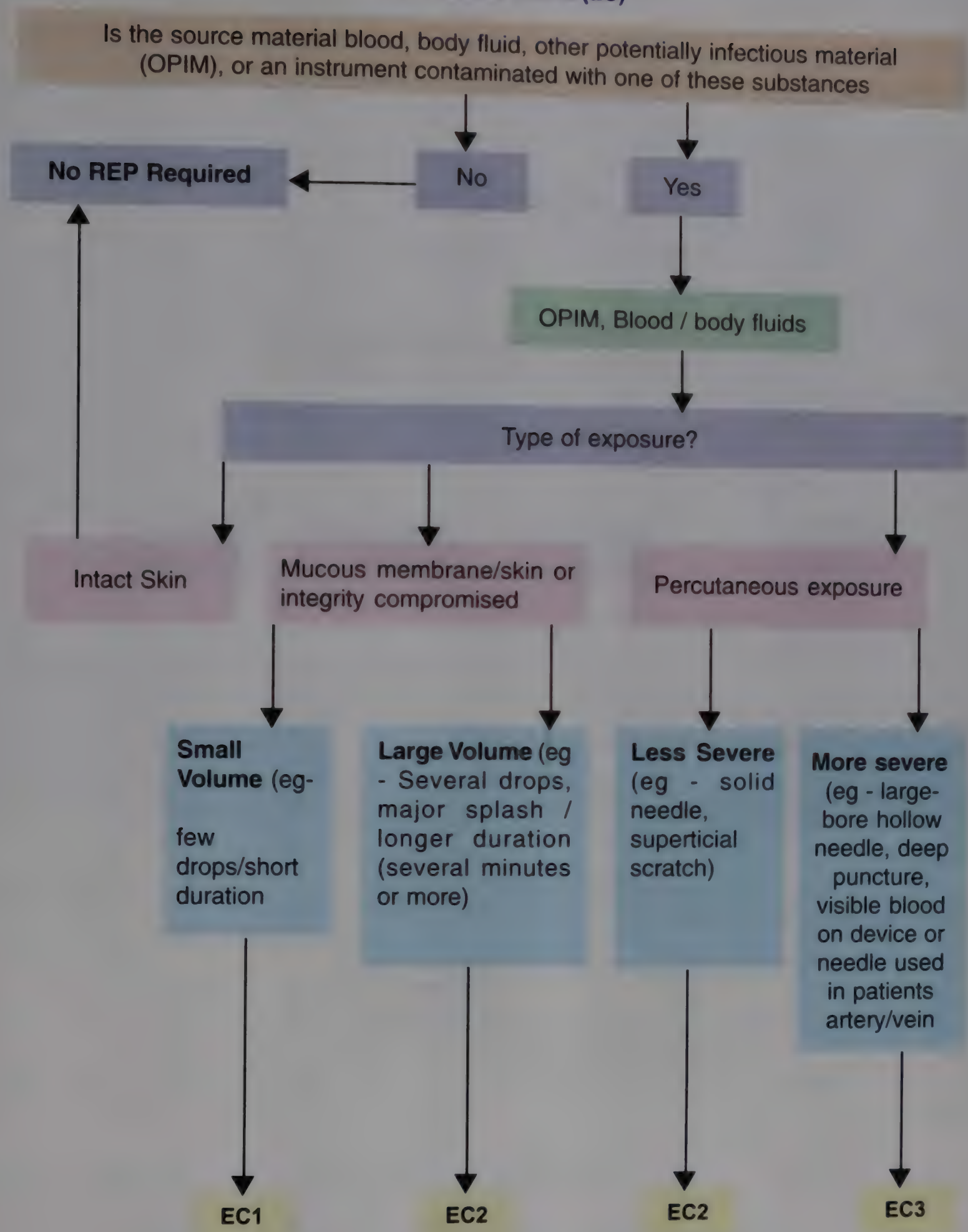
3. Post exposure Prophylaxis:

The decision to start PEP is made on the basis of degree of exposure to HIV and the HIV status of the source from whom the exposure/infection has occurred.

3.1 Determination of the Exposure Code (EC)

Exposure code can be defined as per the flow chart given below. It may be classified into three categories, EC1, EC2 and EC3, depending upon the nature of exposure.

EXPOSURE CODE (EC)

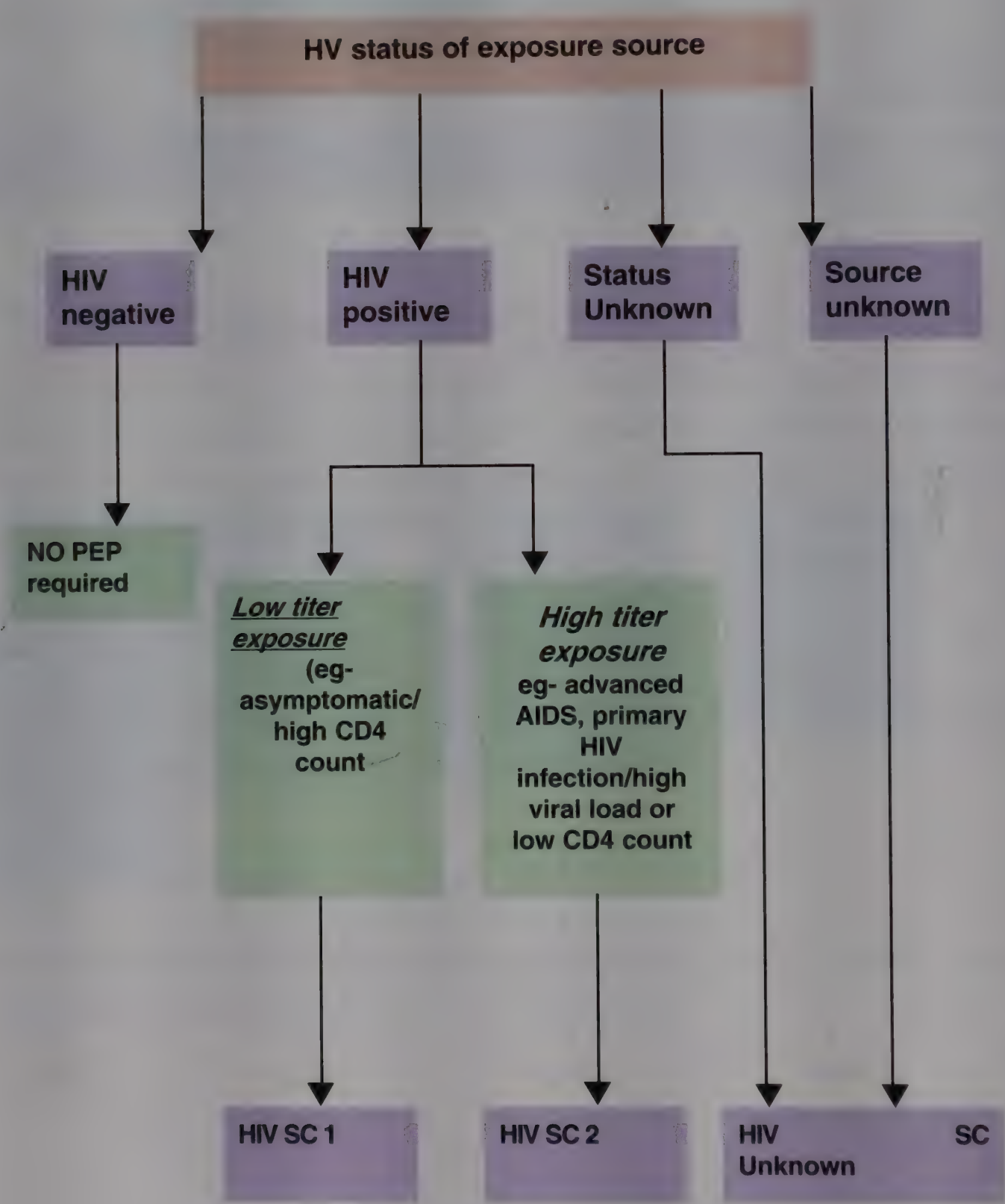


3.2 Determination of HIV status Code (HIV SC)

The main purpose of determining HIV status code is to know the HIV status of source of exposure. It may be classified into three categories –

HIV SC1, HIV SC2 and HIVSC Unknown.

HIV STATUS CODE



4. Determination of PEP Recommendation

EC	HIV SC	PEP Recommendation
1	1	PEP may not be warranted
1	2	Consider Basic Regimen (Negligible risk)
2	1	Recommend Basic Regimen (most exposures are in this category)
2	2	Recommend Expanded regimen
3	1 or 2	Recommend expanded regimen
2/3	Unknown	if setting suggests a possible risk : (epidemiological risk factors) and EC is 2 or 3, consider basic regimen

- Basic regimen:

Zidovudine (AZT) –
 600 mg in divided doses (300mg/twice a day or
 200 mg/thrice a day for 4 weeks
 +
 Lamivudine (3TC) –
 150 mg twice a day for 4 weeks
- Expanded regimen:
 (4 weeks therapy)

Basic regimen
 +
 Indinavir – 800 mg/thrice a day,
 or any other protease Inhibitor.

5. Testing and Counselling

The health care provider should be tested for HIV as per the following schedule-

- i) Base-line HIV test - at time of exposure
- ii) Repeat HIV test - at six weeks following exposure
- iii) 2nd repeat HIV test - at twelve weeks following exposure

On all three occasions, HCW must be provided with a pre-test and post-test counselling. HIV testing should be carried out on three ERS (Elisa/ Rapid/ Simple) test kits or antigen preparations. The HCW should be advised to refrain from donating blood, semen or organs/tissues and abstain from sexual intercourse. In case sexual intercourse is undertaken a latex condom be used consistently. In addition, women HCW should not breast-feed their infants during the follow-up period.

6. Duration of PEP:

PEP should be started, as early as possible, after an exposure. It has been seen that PEP started after 72 hours of exposure is of no use and hence is not recommended. The optimal course of PEP is not known, but 4 weeks of drug therapy appears to provide protection against HIV.

If the HIV test is found to be positive at anytime within 12 weeks, the HCW should be referred to a physician for treatment.

7. Pregnancy and PEP:

Based on limited information, anti-retroviral therapy taken during 2nd and 3rd trimester of pregnancy has not caused serious side effects in mothers or infants. There is very little information on the safety in the 1st trimester. If the HCW is pregnant at the time of exposure to HIV, the designated authority/physician must be consulted about the use of the drugs for PEP.

8. Side-effects of these drugs:

Most of the drugs used for PEP have usually been tolerated well except for nausea, vomiting, tiredness, or headache.

9. Steps to be undertaken by the Infection control officer on receiving information about exposure:

- ✓ All needle-stick/sharp injuries should be reported to the State AIDS Control societies giving the Exposure Code and the HIV Status code.
- ✓ The State AIDS Societies should in-turn inform NACO about the cases periodically.

- ✓ A register should be maintained in all hospitals and at the level of the State AIDS Control societies
- ✓ NACO has decided to supply PEP drugs to all cases in government hospitals through the State AIDS Control societies
- ✓ Infection control officers in all hospitals have been directed to ensure that PEP drugs are available at all times.

Annexure – I

Name and Full address of Hospital _____

Needle Stick Sharp Injury Protocol

Name of H.C.W. : _____

Section of HCW : _____

Employment No. : _____

Date of Needle Stick /Sharp Injury: _____

Date Of Reporting to Casualty: _____

Site & Depth Of Injury: _____

Nature Of Injury: Needle Prick / Sharp Cut /Laceration / Splash Of Fluids / Splattered Glass

Action taken in casualty

Hep. B. vaccination given Yes / No

HBIG Yes / No

If Immunized: Date: _____ Intradermal / Intramuscular

Anti HBsAg Titre _____

HbsAg Positive / Negative

HIV antibody Positive / Negative

Information about Source of Contamination (If Available)

- Whether the patient has symptoms of HIV infection or no symptoms
- Serum sent for: (Reports to be entered in follow up visit)

01. Anti-HIV

02. HBs-Ag

03. Anti-HCV

04. CD4/CD8 counts

Annexure – II

Safety Equipments for Laboratory

1. Laminar flow. Biosafety cabinet (type II) with ducting at side room.
2. Needle burners.
3. Swing out, heavy duty doors.
4. Autoclaves.
5. Electric loop sterilizer
6. Airconditioners in all laboratories but must in TB labs.
7. Wash basin with elbow controls

